

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our

editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

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VOL. XLII, No. 2.

FRIDAY, JANUARY 11, 1907.

The Interstate Commerce Commission has begun its first accident investigation (Terra Cotta), but has adjourned with only a few of the witnesses heard. From what has come out at the coroner's investigation it is evident that there will be conflicting testimony on vital points, and it is therefore impossible to reach a conclusion now. Some important points are, however, quite evident already. When we wrote last week, the two principal questions appeared to be first as to a distant signal, and, second, as to the record of the engineman and of the superintendent as regards his supervision of enginemen. As to the signal, it is already shown that there was the faulty, though very common, condition of a stop signal immediately in front of the office (where the signal man could not see the lamp) and no distant signal. With no distant signal, enginemen, unless rigidly disciplined, are very apt to take chances when, on account of fog, they cannot see the signal far away, and this appears to have been common at Takoma. As for the engineman, he had been on duty so long—48 hours, with only two periods of four hours each for rest—that no one can have confidence in his assertion that he was wide awake when passing the signal stations, however honest he may seem to be. The officer in charge of enginemen appears not only to have taken insufficient action to know how the enginemen were worked, but to have taken positive action to encourage a practice which involves grave danger; that is, he allowed long hours and allowed the trainmaster or some one performing trainmaster's functions to request overwork to such an extent that the dereliction must be regarded as flagrant. An officer can hardly be regarded as excusable for being ignorant in such a case. In closing, at 6:30 p.m., a block office (Takoma) which is kept open during the day, the signal arms are fastened in the all-clear position, but the signal lamp is extinguished. This being the practice, an engineman can excuse himself for going past such a station without looking for it. This excuse is given by Engineman Hildebrand in this case. His excuse, poor as it is, depends, however, on authoritative knowledge by the engineman as to the hour when an office should be closed and on the accuracy of his watch; and also on his making no mistake in reading the time from his watch. Trusting enginemen thus

to keep track of the closing hour of signal stations is a troublesome practice at best; and even if carefully managed, it is a violation of the best block signal practice, one of the principles of which is that all movements shall be safe, irrespective of small errors in reading timepieces. The only proper practice is to leave the signal light burning, and require enginemen to see the signal the same as though the block station were open. The semaphore arms being put in the proceed position, there certainly can be no inconsistency in leaving the light showing "proceed." On the Chicago, Milwaukee & St. Paul, the Chicago & Alton and the Seaboard Air Line, the lights in such cases are left burning. A proceed signal showing at such a station may interfere with necessary or desirable permissive blocking of freight trains during the night, but if this were a serious difficulty it would be practicable to provide a distinctive light. It would seem desirable to devise such a light even if it were found necessary to use an extra lamp or two to do it.

Just at this time, when passage of a law to allow pooling of railroad traffic has been advocated by the President in a message to Congress, an important experiment of handling traffic under this system is being put in effect in England. An immense tonnage of grain, timber, machinery and other bulky freight is received at Liverpool by sea. A number of railroad lines compete for this traffic out of Liverpool. The lines which directly serve that port have agreed to put in effect a pool to last for 10 years, covering unmanufactured grain, timber, incomplete machinery and railroad material carried between Liverpool and all competitive stations of the various lines. Companies in the traffic agreement are the London & North Western, the Lancashire & Yorkshire, the Great Western, the Midland, the Great Central, the Great Northern, the Cheshire Lines and the Great Central-Midland joint lines. Except for towns in which the London & North Western and the Lancashire & Yorkshire have a joint monopoly, which is covered by an agreement made two years ago, all towns directly fed by two or more of the roads mentioned come within the operation of the pool. Traffic received at competitive junction points from roads not in

the agreement is also included. The pool, as nearly as can be learned from the press despatches, is a straight pool based on the percentages of the traffic which have during the past year or so been handled by each of the different roads. Beginning January 1 each company is to receive this agreed percentage no matter how much or how little of the traffic is carried. Obviously, such an agreement would be impracticable in this country without a further provision covering the situation when one road carried considerably more or less than its agreed percentage. This question has apparently been put under the entire control of the English Railroad Clearing House which is to regulate the movement of traffic over the different lines. If that institution is able to carry on so delicate a duty as this of apportioning a large traffic among many competitors with success, it will be an added tribute to its importance as a part of the English railroad machinery. Unfortunately America is too large and too far stretching to make it probable that a similar institution could here be established with success. If the time does come when railroad pools shall be authorized, however, it should be possible to find men fair minded and respected enough to carry out the provisions of such arrangements with satisfaction to all concerned.

The new rate law gives to the Interstate Commerce Commission the fullest authority over railroad statistics and accounts. With the power, not only to prescribe what accounts shall be kept and how, but to forbid the keeping of any unapproved statistics, the Commission has a remarkable opportunity to bring about improvement in the form and substance of returns of railroad operation, more particularly of annual reports. This side of the Commission's work is in charge of Prof. Henry C. Adams, and is so complicated and extensive in its possibilities that it must be accomplished slowly. The committee on corporate, fiscal and general accounts of the Association of American Railway Accounting Officers has been co-operating with Mr. Adams, and at a meeting held last month in Washington the question was raised whether results of "outside operations" of a railroad should be included in its operating earnings and expenses, or carried directly to the income account, and if so carried, whether as a gross or a net item. This question is important, first, because comparison between the report of a road which had such outside operations and one which does not would be misleading; and second, because inclusion of the results of outside operations, with the results of strict railroad operations, improperly affects such statistical units as revenue per train-mile, revenue per ton-mile, revenue per passenger-mile and the operating ratio or percentage of operating expenses to gross earnings. After considerable discussion this question was referred to a special committee made up of the general auditors of the Lackawanna, Erie, Lehigh Valley, Pennsylvania and New York Central. As a result of the consideration of the subject by this committee and Prof. Adams a circular has been issued with the purpose of learning the methods by which outside operations are now treated by railroads and the opinions of accounting officers as to the way in which such operations should be treated. "Outside operations," according to the committee, include all operations for which specific arbitraries are allowed in billing for a special service other than rail transportation, or for which an additional collection is made from shippers, consignees or passengers for a special service performed. They include ferry lines, lighterage departments, lake lines, coal transfers, coal storage plants, coal and ore docks, cold storage plants, grain elevators, stock yards, cab and omnibus lines, baggage and express transfers, express lines, eating houses, hotels, dining cars, sleeping and parlor cars and passenger and vehicle toll service on bridges. It will make railroad accounts much more open and clear to have definite rules which must be followed by railroads in making returns from these various operations which are outside of the pure business of rail transportation. The fact that these outside operations have been sometimes used to cover up underhand operations is an important though a secondary reason why some such definite system should be adopted. The main importance of new rules in this regard will be a potential one, for it is probable that few instances of dishonest or illegal practices are being hidden under the cloak of outside operations; but the opportunity for such dishonest practices will be taken away. It should be possible under the amended rules to make a comparison which is fair between different roads because no matter how different and various their operations they are put on the same basis in their reports. In this way the solid facts of a railroad's operations will be presented without the need of making a guess at the effect on the total of certain indeterminate outside factors.

SMOKE PREVENTION IN CITIES.

Smoke prevention in those cities which draw their supply of fuel from the soft coal districts has, on the whole, made little progress in recent years. This is perhaps due to the fact that so far as the public has been a factor in the problem, dependence has been placed upon ordinances which have been merely prohibitive. It is likely that laws prohibiting smoke, if unaccompanied by constructive legislation, will always be insufficient to cope with so complicated a problem. To decree that there shall be less smoke is a simple matter, the real difficulty appearing when it is attempted to devise and to secure agreement upon a system of procedure which, if followed, will lead to the desired result. The sources of city smoke stated in very general terms are domestic fires, small industrial fires including those under boilers of less than 100 horse-power, large industrial fires, including those employed in metallurgical furnaces and boiler plants of considerable size, and locomotive fires. In the elimination of smoke, the fires of each of these groups will need to be dealt with as a separate problem. Existing domestic fires, for example, may be entirely suppressed by serving a city with a supply of low-priced gas for cooking and by the installation of stoker-equipped central stations of large capacity for heating. It can be shown that there is nothing impracticable in this suggestion. The cost of gas production diminishes as the amount which can be sold is increased and at existing prices gas is much used for cooking in many of the cities of our country. The practicability of heating from central stations is also well demonstrated, though in no city has there as yet been worked out a comprehensive plan which can be depended upon to deliver heat to all of its homes. The small and large industrial fires must in a similar manner be attacked. Dependence upon central stations will permit the complete suppression of many small boiler fires which to-day are prolific sources of smoke. The introduction of stokers under many of the larger fires, and the substitution of gas producers for others, will go far to solve the problem. These statements, while brief and fragmentary, are sufficient to disclose the magnitude of the problem and to suggest a procedure which, if followed under the leadership of a competent engineer, would permit most cities to develop gradually into a condition of practical smokelessness. A plan of co-operation must be outlined which will attract capital to central station work, and which will induce large manufacturers to make extensive use of producer gas. This accomplished, the way is open for prohibitive legislation with good prospect that it may be effectively enforced.

The fact is recognized that any general scheme which has for its purpose the reduction of smoke in cities, must necessarily involve the steam locomotive. None understand this better than those who are responsible for the management of our great railroads, and none are more serious in their desire to improve practice in this particular. The vast expenditures of the New York Central for the purpose of securing electric traction within the limits of its New York terminal, may be accepted as a measure of the cost to a single corporation in a single city, of complete smoke suppression. The decree of November 17 of the Commissioners of the District of Columbia, prohibiting the use of any except electric locomotives in drawing trains into the new Union Station, is evidence of a growing disposition on the part of the public to insist upon some relief from the present-day conditions. But the cities are few which can reasonably expect, during the lifetime of the present generation, to be exclusively served by electric traction. Relief from present conditions, however, does not necessarily involve electricity. It is likely that a large number of cities will, in the next decade or two, admit to their precincts only such steam locomotives as are fired by smokeless fuel, while the remainder will need to be satisfied with such reduction of smoke as may result from the progress which will naturally be achieved in the art of firing the normal locomotive using normal fuel.

In the matter of smokeless combustion in locomotive service there are many things to learn, and facts which are already well established must be widely apprehended. It is well known that the use of small jets of steam properly arranged above the fires will reduce materially the amount of smoke emitted from the locomotive stacks. It has been assumed that the use of such jets necessarily involved loss in the efficiency of the boiler through the consumption of steam by the jets, and because of their cooling effect upon the firebox. But the extent of the loss resulting from such jets has never been determined, and it is not unlikely that if properly proportioned and arranged, they will add as much as they take away.

Another most promising field for experimentation is to be found

in the use of the so-called "sized coal." Satisfactory combustion demands that all portions of a fire be uniformly exposed to the currents of air passing through it. Obviously a fire made up of lumps of fuel varying in size, is not thus exposed. A large lump, when thrown upon a bed of burning coal, shuts out the passage of air from the area it covers. Moreover, the currents which pass up and around the lump are deprived of much of their oxygen by the burning coal below. Such a lump first smokes, then gradually ignites and continues to smoke, until the process of combustion has so broken it up that air may pass through it. Similarly a heavy shovelful of very fine coal, if not well spread, checks the draft at a point where it falls, producing results similar to those which take place in the presence of the lump. Such inequalities in the distribution of air throughout the area of the grate with the resulting smoke are reduced, and will sometimes almost disappear if the coal, of whatever quality, is sized before it is fired. While formal instructions frequently assume that the fireman will size his coal before using it, the work cannot be perfectly accomplished upon the locomotive. A crusher and screen, however, if installed and operated at important coaling stations, would permit locomotive tenders to be supplied with coal sized as uniformly as standard anthracite. The use of such fuel would result in a two-fold advantage; it would make possible the maintenance of better fires and consequently would permit locomotives to be worked to higher power, and it would effect a material reduction in the amount of smoke they would give out from the stack.

Another possible source of relief is to be found in the use of coal briquettes. While it has been generally assumed that the low price at which coal can be bought in this country will not justify briquette making, it is by no means clear that such a conclusion is justified. Experiments which are now being conducted under the direction of the United States Geological Survey at St. Louis and elsewhere, in the course of which many different kinds of coal are briquetted have developed a number of interesting facts. So promising have been the results that the Survey proposes to give, during the coming year, a large amount of attention to this phase of its work. It is argued that coal of inferior quality, which under existing conditions is left in the mine, may be successfully handled by briquetting. It is believed that mine operators will find it advantageous to install briquette plants which, when possessed, may be employed in working off grades of coal which are now not marketable. Such a process is likely to supply large quantities of comparatively low grade fuel. The experiments have already involved the use of briquettes upon locomotives, and while the Survey has made no report covering this phase of its work, one result of the accurate sizing secured through the process of briquetting, will be a diminution in the amount of smoke emitted.

In view of the facts presented, it is evident that those who seek to diminish the amount of smoke given out by locomotives will find much to interest them in propositions involving the steam jets, the use of sized coal and the promised early introduction of the briquette.

THE HARRIMAN INFLUENCE.

The Interstate Commerce Commission is at work on an investigation of the Harriman lines. Already important facts have been brought forth—facts previously guessed at or believed to be true, but now a matter of public record. In the first place, Mr. Harriman's power in the conduct of railroads of which he is the head is, to all intents, absolute. The ultimate authority in the organization of a railroad lies normally with the board of directors. Within recent years it has come to be not an uncommon practice for the full board to delegate its power when not in session to an executive committee made up of four or five of its most prominent and representative directors. The Union Pacific, the corner stone of the Harriman operations, has carried this process one step further. By resolution of the board the chairman of the executive committee is authorized to act with all the powers of the executive committee when the committee is not in session; that is, with all the powers of the board of directors, or, to be still more definite, with absolute power over the road. Mr. Harriman is the chairman of the executive committee.

Back in 1901, with funds which he was able to command, Mr. Harriman entered upon his famous Northern Pacific purchases. Though he was in the end defeated in his purpose of getting control of the Northern Pacific, the investments which he made in the stocks of the two Hill transcontinental lines turned out to be most

profitable. This fortunate investment or speculation, whichever it may be called, has been the basis of his later operations in the securities of other railroad companies. The annual report of the Union Pacific for the year ended June 30, 1906, showed that the company had cash and demand loans outstanding amounting to \$56,000,000. It was also exceptionally strong financially in other ways. The investigation by the Commission has already brought out how these large cash resources were used. Since June 30 the Union Pacific, or the Oregon Short Line which amounts to the same thing, has bought the stock of other railroads as follows:

	Amount.	Per cent. of this issue.	P. c. total stk outstanding.
Illinois Central	\$28,123,100	30 per cent.	30 per cent.
Baltimore & Ohio preferred.....	7,206,400	12 "	18 1/2 "
Baltimore & Ohio common	32,334,200	21 "	8 "
N. Y. Central & Hudson River...	14,285,745	8 "	4* "
Atch., Topeka & Santa Fe pf....	10,000,000	9 "	3 "
Chl., Milwaukee & St. Paul com.	3,690,000	4 1/2 "	2 1/2 "
Chicago & North-Western com...	2,572,000	3 "	38 "
St. Joseph & Grand Island com.	2,900,000	63 "	
St. J. & Grand Isld. 1st pf (abt)	932,300	17 "	
St. Joseph & Grand Island 2d pf	1,125,000	36 "	

*Including \$30,000,000 more held in the Harriman interest, 15 per cent.

It was also brought out on Tuesday of this week at the hearing in Chicago that \$30,000,000 more Atchison, Topeka & Santa Fe stock is held by Mr. Harriman and his associates, making a total of \$40,000,000, or about one-seventh of the total capitalization of the great Santa Fe system held in the Harriman interest.

Of these great purchases of the securities of other railroads, only one can be considered to be a natural one in the development of the Union Pacific system under old-fashioned ideas of railroad development. The St. Joseph & Grand Island is a road which will form a link in a new through line which the Union Pacific is making from Kansas City to its main line in Nebraska, thus doing away with the necessity of hauling through traffic from Kansas City west over the old Kansas Pacific to Denver and thence north to Cheyenne, a roundabout way with much less favorable grades than the main line. The new cut-off is already built from Topeka northwest 37 miles, and by the construction now under way of about as much again, will meet the St. Joseph & Grand Island at Marysville, Kan., whence that road runs to Grand Island, Neb., on the Omaha-Cheyenne main line.

The other purchases mark the extension of the Union Pacific's influence in an entirely different way—the reaching out into traffic territories untouched by the Union Pacific as a railroad. The Illinois Central is the best line between Chicago and the Gulf. The Baltimore & Ohio has come to hold a place second only to the Pennsylvania and the New York Central as a St. Louis and Chicago to New York trunk line. The New York Central controls not only its own lines ending at Buffalo, but western connections to Chicago and St. Louis. The Chicago, Milwaukee & St. Paul and the Chicago & North-Western are the two most important granger lines and eastern connections of the Union Pacific main line at Omaha. Also the St. Paul is at work on a line to the Pacific coast at Seattle, a point to which the Union Pacific is now extending its Oregon lines. The Chicago & North-Western, too, while it has not definitely committed itself to a Pacific extension, already parallels the Union Pacific on the north for about 1,000 miles west from Omaha. It did not need the testimony of President Ripley on the stand to prove that the Santa Fe is a competitor of either the Union Pacific or the Southern Pacific throughout its length.

A company is not actually controlled by less than 51 per cent. of its stock, but experience has shown that a condition approximating control can be obtained by an aggressive interest which holds much less than a majority of a railroad's stock. Putting the case not as strongly as this, however, but only considering that the Union Pacific purchases give it an influence in directing the policies of the various roads whose stock it has bought, the Harriman power is far-reaching. In the territory between the Missouri river and the Pacific coast everything with three exceptions is under Harriman ownership, control or influence. The exceptions are the through Gould line which will be completed from St. Louis to San Francisco by the building of the Western Pacific, and the two Hill roads, the Northern Pacific and the Great Northern. The rest can be depended upon to carry out the will of "Harriman and associates." Between the Missouri river and Chicago the Union Pacific has always lacked its own connection. The Illinois Central offers it one, the North-Western and the St. Paul each another. In trunk line territory the Union Pacific will share with the Pennsylvania the management of the Baltimore & Ohio, and with its friends, will have no small share in the management of the New York Central. The dominating line from Chicago to the Gulf appears to be already well within its

control. Thus the Harriman influence is stretched out over the whole country, except the far Northwest and the Southeast.

There are several things to be considered about this campaign of acquisition carried on by Mr. Harriman. First and most important, does it violate the Sherman anti-trust law? Opinion on this point will, no doubt, first be passed by the Commission and later, if necessary, by the courts. Leaving aside therefore this side of the question, there are two other important viewpoints. No one man should have so great power to speculate with the resources of a great and rich system of railroads, with all the incidental opportunities for personal profit, as Mr. Harriman has had. It is wrong economically and morally, if not legally. Yet at the same time it must be recorded that in the main that great power has been exercised by Mr. Harriman with an ability and a success as reflected in returns to shareholders which mark him as a railroad genius. His campaigns have been such as might have brought disaster to all but himself and his close associates. Instead they have brought profits to the holders of his securities. This favorable result appears to be due in about equal portions to his genius for railroad management and to the striking prosperity which has come to the territories through which his railroads run.

The immediate future holds no more interesting development of the railroad situation in this country than the final decision as to the status of the Harriman system and influence. If the methods which have been followed are legal and approved, it is not too much to say that there will soon be a concentration of railroad ownership in this country far greater than ever before. If the Harriman methods are condemned and forbidden, what is to be the ultimate situation of the associated railroad companies?

The Interstate Commerce Commission in a formal notice, signed by the chairman, has advised Congress that it "is credibly informed that automatic devices for preventing railroad collisions have been so far perfected as to justify thorough experimental tests of their practical usefulness; that the Commission is of the opinion that such tests should be conducted by officials of the Government and at its expense; and that the Commission therefore recommends that suitable legislation be promptly enacted authorizing the Commission, or some official body, to supervise and conduct experimental tests of such safety devices as appear to be meritorious, and that an appropriation be made sufficient to secure the most competent experts and defray the other expenses. * * *." The Commission is evidently looking for new worlds to conquer. Congress is struggling with ship subsidies and tariff subsidies, and now it is to be asked to establish a subsidy for inventors who cannot prevail upon the railroads to test and adopt their numerous and highly meritorious devices for saving human life. Will the Commission, if it finds one or a dozen sure cures, ask Congress next to compel the railroads to adopt one or all of them?

The Prussian government contemplates two changes in the administration of the State Railroads, which the growth of traffic and the experience of recent years have shown to be desirable. The first of these is simply an increase in the staff of officers attached to each "directory," said directory being the groups of general officers managing definite systems, usually 800 to 1,200 miles in extent. The regular staff have duties approximating those of general officers of one of our railroads, and are regularly assigned by the Ministry. The change will enable the President of such directory to draw from the administrative corps of high engineering and operating officials assistants to such general officers, to serve either temporarily at times of unusual pressure of business or permanently, as the case may require. To do this Parliament will be asked to provide for an increase of officials of these grades. The other change is the creation of a Central Railroad Bureau, for the performance of duties which affect all the railroads, or at least of several of the directories. Purely administrative duties, as heretofore, will be conducted by the Ministry; but heretofore in such matters as the distribution of rolling stock among the several lines, the study and testing of improvements in road, apparatus and equipment, and methods of operation, etc., each subject has been assigned to some one of the operating directories, and as these are more and more occupied with their regular duties, it is thought best to have a special office for such general duties. It may be added that the most effective administrative officers are not always, perhaps are seldom, the best for inquiring into new methods; and that the

very highest talent is sometimes not fitted for strenuous executive duties. Another advantage of a Central Bureau is that it will be in close touch with the Ministry, while all but one of the directories are more or less distant.

Mr. James J. Hill is reported as saying in substance that when he travels on a railroad nowadays he takes his life in his hands; he wonders whether the journey is to be his last. The only fact which he gives to justify this statement is that permissive block signaling is practiced everywhere. Mr. Hill probably did not expect to be quoted, and it is doubtless unfair to analyze his statement in much detail; but it has been published all over the country, and it serves as a good example of how easily facts may be perverted. It is true that two trains are run in the same block section frequently on every road; but it is also true that this is done with passenger trains very rarely and only under rigid restrictions. It is done a good deal with freight trains, but at very low speeds; speeds at which collisions do occur, it is true, but usually not disastrous ones. The practice jeopardizes the life of Mr. Hill and other passengers only when engineers are careless, and then only in situations where a collision of freight trains might derail or damage a passenger train on an adjacent track. As to careless engineers, Mr. Hill could probably furnish expert information as to whether that element of danger is any worse than it was five, 10 or 20 years ago; and if it is, what good reason exists for the deterioration. It is also true that there are differences between railroads. On well managed roads—and not all railroads are badly managed—permissive blocking is forbidden, even with freight trains, in times of dense fdg. As Mr. Hill is well acquainted with railroad presidents possibly he could do a useful public service by naming names.

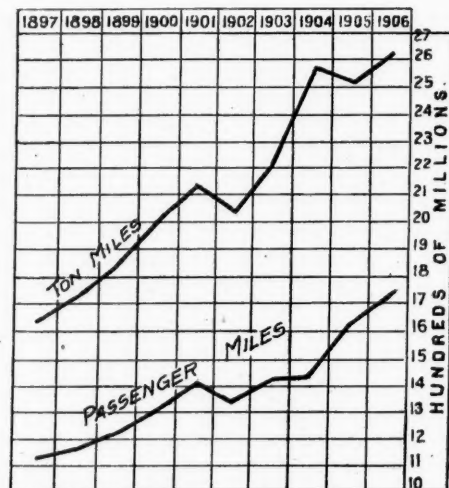
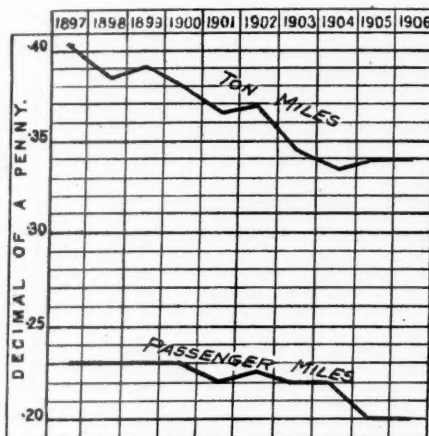
CONTRIBUTIONS

Traffic and Rates in India.

Calcutta, Dec. 13, 1906.

TO THE EDITOR OF THE RAILROAD GAZETTE:

An issue of the *Railroad Gazette* recently received by me contains a summary of the general statistics for American railroads published in Poor's Manual. The difference between the average charge on American lines and on this line in the case of goods



Rates and Traffic on the East Indian Railway.

1,885 Miles open in 1897. 2,263 miles open in 1906. Left-hand diagram shows charges per unit of traffic. Right-hand diagram, traffic movement. Average charge per passenger, 1 penny (2 cts.) for each 5 miles. Average ton-mile charge, .68c.

traffic is not great, though we are appreciably lower, but there is a remarkable contrast in the charge in the two countries for the conveyance of passengers. You charge 2 cents a mile; for this amount we take a passenger five miles. You will see that our figures, both the passenger unit miles and goods ton mileage, are very high, I think exceeding the figures of any American line except the Pennsylvania.

W. A. DRING,

General Traffic Manager, East Indian Railway.

Split Rails at Highway Crossings.

Ottawa, Ont., Jan. 2, 1907.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I wish to call your attention to a small but interesting matter that came under my notice some time ago, and that I have never seen reference to in print. On a part of our road running over a sandy plain we found the rails splitting down through the center of the ball, at public road crossings, and only at those places. Naturally we wanted to know why, and here is the result of our study

of the matter. The vehicle traffic over crossings deposited on the rails a small quantity of sand. The vibration of the rail ahead of a train caused this sand to collect in a small ridge on the ball of the rail, in the very center, and the cutting power of the sand under the wheel in time splits the rail.

When I point out an evil I like to give the remedy, but in this case I cannot. Can some of our older track men?

E. J. M'VEIGH,
Grand Trunk Ry.

The First Government Railroad in America.

Vienna, Nov. 15, 1906.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of September 7th you published an interesting article by Mr. C. H. Caruthers under the heading, "The First Railroad Owned and Operated by a Government." This article being principally devoted to the technical history of this line and the locomotives used thereon, many of your readers, especially Americans, will doubtless be interested in the political and commercial history of this first state-owned railroad and its methods of carrying on business. Avoiding recapitulations I beg to quote some abstracts from my book published in 1883, "The means of communication in the United States of America."* For information with reference to the Pennsylvania Railroad I am indebted to the veteran engineer, Mr. James Worall, C.E., Harrisburg, who was at that time engaged in the construction of the lines.

The excellent results of the Erie canal and the ensuing unlooked for prosperity of the state of New York instigated other states to a stirring activity, to offset the influence of New York on the internal commerce. In November, 1824, 48 commercial men of Philadelphia and others founded the "welcomed Pennsylvania society for the promotion of the internal improvements," and accumulated their funds partly by the annual contributions of the members, partly by donations from corporations and private persons. In the following year the society was enabled to send an engineer to Europe in order to "gather information about all valuable improvements regarding canals, railroads, bridges, etc., appropriate to promote the scope of the society."

On April 11, 1825, the legislature of the state of Pennsylvania made a law "for the construction of communications between the eastern and western waters by canals and navigable rivers, to advance agriculture, commerce and industry, to join the mutual interest of the vast natural sections of the state, and consequently to open a rich source for the state revenue. The interest of the state demands that such works were the property of the nation and that the government enters upon their speedy accomplishment with zeal and energy." For this purpose surveys are to be ordered between Philadelphia, Pittsburg and the Lake Erie, also between Philadelphia, the Cayuga and Seneca lakes to the northern boundary of the state in the districts of Cumberland and Franklin as far as the Potomac river, and estimates of the cost prepared for consideration. The long ago planned connection with the great lakes and the so-called Laurentian—the Mississippi and Ohio valley were already partly achieved by the construction of macadam roads, but it needed a more rapid and efficient means of communication. With reference to the reports, the state authorities resolved on February 25, 1826, upon "the construction of a system of canals, especially the Pennsylvania canal, and railroads at the expense of the state between the Susquehanna and the Ohio, to be commenced simultaneously at both ends, and to raise a loan amounting to \$300,000. The work on the canals was commenced in the same year on July 4, the great national holiday.

The Allegheny mountains, dividing the eastern from the western half of the state, formed a serious obstacle. On the eastern side the line was to follow the course of the Juniata as far as Hollidaysburg, on the other side from Johnstown along the Kiskiminetas and the Allegheny river to Pittsburg; between them there lay the ridge, the crossing of which was to be considered and determined by the appointed railroad and canal commission. The commission had also to investigate, if a connection were possible farther north between the Susquehanna branch and the Allegheny river. After long discussions, whether it was desirable and feasible to build a continuous canal with a tunnel 4.5 miles long in an altitude of 1,900 ft., or a railroad, this important point was decided in favor of the latter, *f. e.*, a railroad, from Hollidaysburg to Johnstown, with 10 inclined planes.

According to the recommendations of the commission, and to meet the demands of the traffic, the construction of a series of railroads and canals was decided upon and the state undertook to build them. So the gateway of the first state railroad was opened at a time when the doubt concerning the practicability of an iron road was scarcely overcome. Thus the connection between Philadelphia and Pittsburg consisted alternately of railroads and canals, *viz.*:

a. The Columbia Railroad (82 miles), the first easterly section

from Philadelphia to Columbia on the Susquehanna, the law for the construction of which was passed on March 24, 1828, while the work itself was commenced in the following year. The line designed as double track started between Broad and Vine streets in Philadelphia and ended on the great canal basin of the Pennsylvania canal in Columbia. One track was finished in April, the other in October, 1834; the maximum gradients were 1.176; the minimum radius of the curves 630 ft. The line crossed 3½ miles beyond Philadelphia, near Peter's Island, the watershed of the Schuylkill and the Delaware, by means of an inclined plane 2,805 ft. long and 187 ft. high, with gradients 1.15. A second incline was erected at Lancaster 1,800 ft. long, 90 ft. high, gradient 1.20. Except the inclined planes the whole line was worked by horses or mules. In 1835, shortly after its opening, there came five locomotives from England, and these were put on the road; they occasionally ran up the incline, but without cars. The service being unsatisfactory, two of the locomotives were at once sold to the Camden-Woodbury Railroad. The later performance of a Norris locomotive, "George Washington," which pulled up the incline two loaded wagons on July 9, 1836, was a surprise to all railroad men.

After passing the Schuylkill bridge the trains had to be divided; a couple of vehicles were shunted to the foot of the incline and here fastened to the endless rope carried around horizontal pulleys. The traveling speed of the rope, 3 in. in diameter, was six miles an hour. When all the vehicles were brought up to the summit of the incline they were again coupled together, this requiring another half hour, and an engine was put in front. The traveling speed on the Columbia Railroad was considerably less than on other railroads, and for passenger trains was about 15 miles in ascending and 12 miles on the slope. For freight trains it was about 12 and 10 miles, respectively. The great loss of time, the exorbitant expenses for the maintenance of both the permanent way and the cables (which lasted hardly one year and cost over \$2,000), especially the imminent danger in the case of a breakage of the rope, showed the mistake in the disposition of the whole work, which was regarded as a great failure and accordingly much attacked.

b. The eastern section of the Pennsylvania canal, commencing at Columbia, where it was connected by means of the Susquehanna canal with Havre de Grace, on the Chesapeake bay. The canal (44½ miles long, with an ascent of 116 ft., opened 1871) runs in a northwestern direction on the left bank of the Susquehanna, joins the Union canal in Middletown, proceeds through Harrisburg to Duncan's Island, crosses the Susquehanna and branches off both to north and west.

c. Near Duncan's Island commenced the Juniata section of the Pennsylvania canal, which ran by way of Mifflintown, Lewistown and Huntingdon to Hollidaysburg (127.5 miles long, ascent 554½ ft., opened 1830). More than six months every year the canal was blocked by ice. In 1838 heavy rainstorms burst the banks and swept 39 miles away; the traffic was stopped for half a year.

d. From Hollidaysburg started the second railroad line, the unhappily situated Portage Railroad across the Allegheny mountains. It crossed the glen of Blairs Gap at 2,491 ft. above the sea and sloped down along the Conemaugh valley to Johnstown. The construction of this road, remarkable for its boldness, was decided on March 21, 1831, and completed in March, 1834. The rise from Hollidaysburg to the summit amounted to 1,398.7 ft., the slope to Johnstown 1,171.6 ft.; 2,000 ft. of the aggregate inclination were overcome by 10 inclined planes from 1,500 to 3,100 ft. long, with gradients from 1:10 to 1:14.3, giving a total length of 4.39 miles, besides a tunnel 900 ft. long. The transition from the permanent way to the incline was formed by vertical curves. On the summit level of each plane there were two stationary engines of 35 h.p., but only one at a time in service. A train consisted as a rule of four vehicles with a safety car at the rear end to avoid a sliding back; on longer levels between the planes locomotives were used; on shorter ones, horses. To travel the whole distance, 36.7 miles, required 4½ hours in passenger trains and between 7 and 9 hours in freight trains. The maintenance of the road was very expensive, its efficiency because of the coating of the ropes with ice much reduced, so that the proposition to cover the planes by sheds was favorably received. But that was never done. Moreover, as the railroad depended upon the traffic of the canals on either side, the service had to be discontinued during the winter months.

e. From Johnstown the western section of the Pennsylvania canal led through the valley of the Conemaugh, Kiskiminetas and Allegheny rivers (104.75 miles, with 70 locks and an aggregate rise of 470 ft.) to Pittsburg. The length of the whole main system, both railroad and canals, amounted to 395.45 miles, that is 31.75 miles more than the original Erie canal. The failure of the system in 1834 was chiefly due to the highly unfavorable meteorological situation; nevertheless it had its share in the speedy development of the Pennsylvania. A series of important political questions arose with regard to the state as a transporter, and were publicly discussed; they had to be answered before the traffic could be initiated.

*Die Verkehrsmittel in den Vereinigten Staaten von Amerika, Leipzig, Duncker & Humblot.

As to the canals, the state of things was quite simple; they could be used by every one who paid a certain due.

But question arose as to the mutual relations between a railroad and a turnpike road. Judge James Kent, appointed by the commission, argued on this point in his report that, in virtue of the concession, Act 1804, the societies of turnpike roads were at liberty to build railroads on their turnpikes for the transportation of both persons and freight, provided that the said turnpike roads showed over their entire length a smooth surface, in order that they might be used by any ordinary vehicle. With regard to the simultaneous use of steam cars and ordinary wagons upon this same road, another question had to be considered, but it has nothing to do with the legal question. Stress was laid on the principle that railroads be not regarded as objects upon which any person or corporation has an exclusive right—their use must be free and the construction of railroads can take place on the property of any person whosoever, and consequently also on a territory for which a charter for a common road has been granted. A turnpike was nothing else than an artificial road, for the use of which the licensees have a right to collect a way toll and to erect turnpikes or closing gates for this purpose. Therefore the traffic on such roads is (under certain conditions) free.

Other not less important questions were: should the railroads be public or private roads; that is, should they be administered, operated and exploited by the state or by private persons, and was the user to be at the same time proprietor of the motive power and the means of transportation? While there was no precedent, either in England or in other European countries—for railroads were throughout private enterprises—a special committee was established and charged to advise. This committee started at the beginning from the point of view that the public funds were intended to serve the public interests, especially to benefit the commerce between the east and the west, and could not therefore be spent on a limited locality. The chief task was to reduce the transportation rates for all products of the west, such as grain, lumber, coal, iron, spirits, salt, etc., all of which had only a small (!) intrinsic value; these means of communication had further to serve as competitors with the other eastern ports and their commerce. It was therefore essential that no disposition should be made which could in the least be regarded as a tax upon this commerce or as an aggravation thereof.

There was a conflict of opinion between two parties of the commission as to who should own the means of transport. While one party said that it was an exclusive business of the state, which should administrate the lines by the aid of officials expressly appointed, the other party pleaded eloquently for the lease to a contractor as a most advantageous means. The former suggested that when a monopoly could not be avoided, it were better in the hands of the state than otherwise; the latter believed this motive to be a feigned one, for the transportation of the United States mail was profitably leased to contractors; it was only necessary that the rates for the conveyance of each article per ton-mile should be fixed. Should the state only furnish the motive power then the dissimilarity of the vehicles owned by private persons, who were besides guided by inappropriate economy, would be a great evil; it was therefore in the public interest that the motive power as well as the vehicles should be furnished by the same hand, i.e., the state. In the case the management of the lines were trusted to private persons it was to be properly advertised and the contract not to be concluded for more than three years because it was a first experiment.

In spite of this judgment, the law passed on April 15, 1834, provided that the railroads were public highways upon which everybody had a right to convey passengers or goods. The state as builder of the roads gave them free for public use towards reimbursement of certain charges. Every person, without exception, was permitted to put his own passenger carriages or freight cars on the lines. Because of the regularity and safety of the traffic the state only furnished the motive power, owning no other rolling stock except for the use of the maintenance of the lines.

Each shipper provided his own equipment; some owned but a single car, some a great number. The success of the new industry led, in fact, to the formation of transport companies which owned up to 50 four and eight-wheeled box and flat cars as well as boats on the canals, and were at liberty to fix the rates. As most of the merchandise from Philadelphia went all the way to Pittsburg and had to pass two railroads and two canals it was necessary to devise some means to avoid a threefold trans-shipping. Some of the companies, therefore, had wagons consisting of several boxes which were lifted from the trucks by cranes and deposited in the boats or vice versa, and they had boats divided into three or four separate sections which were carried on flat cars over the mountains and put together on the canals.

The disparity between the vehicles caused frequent stoppages and delays regarding the scheduled time in consequence of their irregular course and even numerous injuries to passengers. In September, 1835, a by-law was passed that all the vehicles on the lines were to be built according to the models and patterns designed

by the state. It is now interesting to review the methods of managing the traffic. The passengers mounted the carriages at different places in town pointed out by the state's agents and were conveyed to the depot, where also the freight wagons from the different magazines stood ready at a fixed hour. Here a train consisting, as a rule, of four passenger carriages and a baggage van or a freight train was formed. Each shipper, after receipt of the merchandise, had to fill out a declaration stating kind and quantity of the different articles, the number of cars loaded, upon which the name of the proprietor and the loading capacity were inscribed, and hand it to the state agent, who calculated the toll according to the tariff and collected the amount. Thereupon the shipper received a manifest as quittance, which had to be produced upon every request to the accompanying train official and delivered at the place of destination. The state agent also took a memorandum of the number of passengers carried each day and the miles traveled, and prepared a return for settling the account. The companies charged per passenger and mile 4 cents, from which the state received 1 cent as way toll, 1 cent as motive power toll, besides 1 cent way toll and 2 cents motive power toll for each four-wheeled passenger car, and the double amount for each eight-wheeled car, so that the companies pocketed on the average 1.8 cents per passenger and mile for their service. The state tolls for goods differed widely, namely, according to a scale of 12 rates from 0.6 to 4 cents and 2 cents on the average per ton-mile; the tolls were low for iron, coal, lumber, stone, lime, and the highest for general merchandise, dry goods, furs, etc. The state compensated the companies for the transportation of the mail with $\frac{1}{1000}$ cent for every 10 lbs. per mile. The state collected on the average 2 cents as way toll, 1.2 cents as motive power toll and 2 cents for each wagon with three tons loading capacity, so that these charges amounted to 3.8 cents in the aggregate per ton-mile, whereas the shippers collected about 9 cents per ton-mile. The tolls on the Portage railroad were the same, except a higher motive power toll. At the end of 1835 the state of Pennsylvania owned 265 miles of railroad, including the sidings.

The report prepared by the Railroad and Canal Commission for the year 1839 recommended the repeal of the law of April 15, 1834, and suggested that the state should at least handle the passenger traffic which but required the appointment of a few more employees and would raise the revenue of the Columbia railroad for more than \$150,000 a year. "The private companies enjoy at present a large gain out of this business and there is no reason why the state should not draw the greatest possible profit out of its enterprise. A chief obstacle to use the main lines of our interior communication is due to its character, namely, that railroads and canals alternate, which causes both considerable delay and cost. Those engaged in the freight transport must possess ample means, whereas not wealthy persons cannot devote themselves to that business. If the state by also taking charge of the freight traffic could enable every proprietor of a canal boat to ship his goods from Philadelphia to Pittsburg and have them delivered there without the interference of a special agent a considerable reduction of rates would follow by this competition and the state lines would receive a large share of the traffic which is now diverted in other directions."

In the report for 1840 the commissioners advocate the abandonment of the two inclined planes, the management of both the passenger and freight traffic by the state, and suggest the substitution of anthracite coal instead of wood fuel besides some ameliorations and economies with regard to the working of the lines. In compliance with this recommendation the second incline was discontinued and replaced with an enormous sacrifice of capital by a circuit railroad of six miles length, with maximum grades of 1:150. In 1840 the state owned 36 locomotives, each of which pulled 35 wagons with a capacity of three tons.

The excessive cost of construction and maintenance, the inadequate traffic which never exceeded 20,000 tons in any year, the operating difficulties explain the failure of this enterprise, the results of which did not in the least equal the anticipations; it was subjected to a great deal of criticism both from the operating and financial point of view. In the early fifties the state relieved itself of this heavy burden, which became the nucleus of one of the most important railroads in the United States, viz., the Pennsylvania Railroad Company.

P. F. KUPKA, C.E.,

Imperial Councillor; Delegate to the International Ry. Congress.

New Cuban Service.

An interesting commentary on the changed relations of the Illinois Central and Southern Pacific is found in the advertisement of a joint winter service from Chicago to Havana, effective Jan. 11. The Illinois Central's "Cuban Special" leaves Chicago at 10 a.m., daily, and on Saturdays (train leaving Chicago Friday) the special runs direct to the ship's side at New Orleans. The new steamship *Momus*, which made her maiden voyage to New York a few weeks ago in the Morgan Line fleet of the Southern Pacific, leaves New Orleans at 1 p.m. Saturdays, arriving in Havana at sunrise Monday morning. With a sea journey as short as this (597 miles) in as

excellent a ship as the Momus, which is as large as the older steamers of the Cunard and French lines now engaged in transatlantic passenger service from New York, the Havana passenger service should be greatly stimulated.

Progress of the Quebec Bridge.

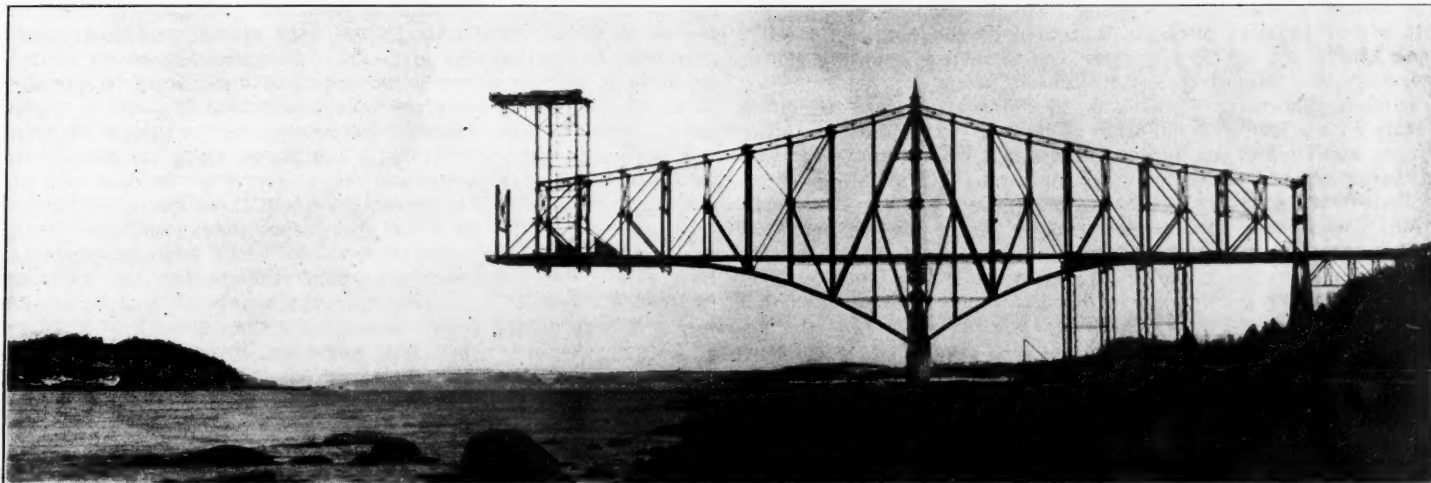
Satisfactory progress was made on the erection of the cantilever bridge over the St. Lawrence river at Quebec during the working season just closed. The south anchor arm was completed and the south cantilever arm as well. The anchor arm now swings clear of the false work, five bents of which have been removed. A total lineal progress of 762 ft. 6 in. was made during the year, including four 50-ft. panels of the anchor arm, the main posts and

passenger leaving Paris at 9.05 a.m. reaches Nice at 10.50 p.m. Between Paris and Marseilles the average speed is 51½ miles an hour; but for the line along the coast only 35 miles an hour. Passengers by this train pay 2 francs for a seat besides the first class fare.

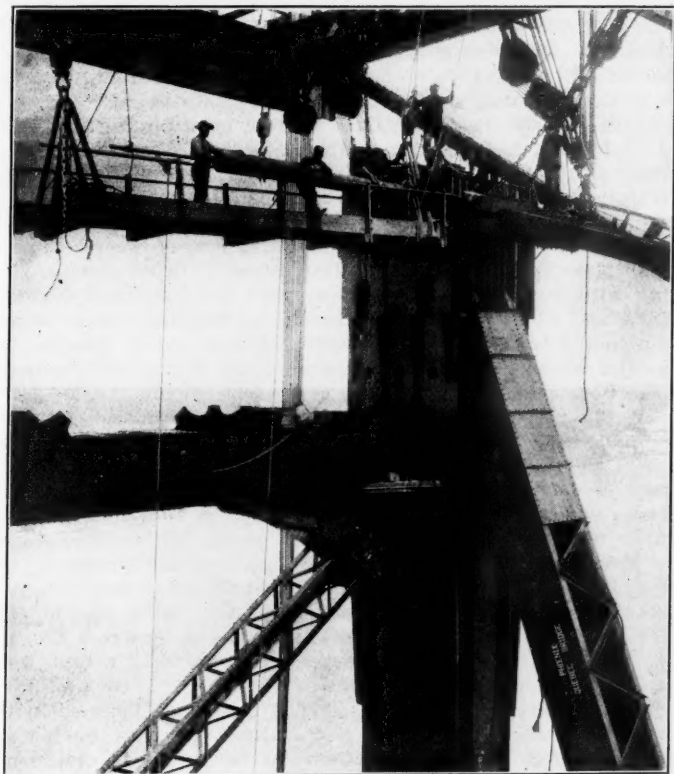
The Alta Vista Collision.

In the collision on the Chicago, Rock Island & Pacific near Alta Vista, Kan., January 2, reported in the *Railroad Gazette* last week, the number of persons killed was 34 and of injured 33. The circumstances attending the failure to deliver a meeting order are given by an officer of the road as follows:

The trains in collision were second 29 and No. 30. Second 29



Progress of the Quebec Bridge at the End of the Working Season, 1906.



Driving Main Top Center Pin 375 Feet Above the Water.

the entire cantilever arm 562 ft. 6 in. long. The erection has been carried on with a traveler built of steel and enveloping the trusses. It is 54 ft. long, 105 ft. wide and 220 ft. high, with 70-ft. top and bottom extensions, and fully rigged weighs 1,120 tons. The bridge is being built by the Phoenix Bridge Co., Phoenixville, Pa.

The Paris, Lyons & Mediterranean Railroad has been running a Riviera express since November 3 which it claims to be the fastest long-distance train in Europe. From Paris to Marseilles, 536 miles, the time is 10 hours and 24 minutes, with six intermediate stops. From Marseilles to the Italian border at Ventimiglia, 162 miles, there are 10 stops, and the time is 4 hours and 47 minutes. The

took the siding at Volland to let No. 14 pass. After 14 had gone by, but while second 29 was still standing on the siding, the dispatcher, having ascertained the fact from the operator, gave an order for it to wait there for No. 30. While the operator was taking this order, second 29 backed out on to the main line and started west. Noting this, the operator, as he claims, while still copying the order, reached around with his left hand and threw the lever to set the signal against the train. But the train failed to stop at the station, or at the water tank west of the station where engines usually take water.

One point for consideration in the investigation was whether the dispatcher did wrong in sending a meeting order to the meeting point, this being contrary to the rules, except in emergency. Superintendent Tinsman has expressed his belief that the dispatcher is not technically responsible, the conditions fully justifying giving the orders as he did.

The operator has told conflicting stories. Even though the visible signal was set by him as claimed (which the officers disbelieve, thinking he expected the train to stop at the tank, and would deliver the order there) he was required by the rule to place audible signals (torpedoes) on the rails, one on each rail, opposite the signal post, which he did not do. It now appears that he is only 18 years old. His signed application for employment shows him to have been 23 on August 30, 1906, and to have been an operator in the service of various roads since 1900. He had been in the service of the Rock Island only three days at the time of the accident. The total number killed was 34; 26 bodies were recovered, the remainder being destroyed by fire. There were 33 Mexican laborers on the train, of whom 31 were killed; these, with white passengers and one porter, make 34 in all. Twenty-three passengers and ten employees were injured.

Railroad Delays in Massachusetts.

The following extracts are taken from the careful and thorough report of the Massachusetts Railroad Commissioners dealing with delays on the railroads having terminals in Boston:

Vexatious delays in passenger and in freight transportation are not peculiar to Massachusetts. Throughout the country railroads are choked with freight and passengers annoyed with delayed trains. The explanation given is that the magnitude of the business has been greater than the expectation of even far-sighted railroad men. This is undoubtedly true, and yet the regular growth of business and the outlook for the future has for a considerable time foretold an era of prosperity. Present conditions are not, therefore, in all cases to be wholly charged up to unexpected demands. There is good reason to believe that more than one management has taken chances with equipment from a policy too appre-

hensive lest expenditures threaten the maintenance of dividends. In dealing with delays on railroads there are always certain obstacles to the regular running of trains that must be reckoned with. No matter how high the standard of equipment weather conditions will interfere with speed. A zero temperature cuts down the power of locomotives, and blinding storms and fogs hide signals. Safeguards are essential to safety, and yet the observance of them must upon occasions hold up trains and prevent the making of schedule time. To the extent that safe operation is alone responsible for train delays companies are justified in asking the public for favorable and not adverse criticism, and we are inclined to believe that the soberly thinking public is always ready to accord it.

Again, train schedules in late years have been adjusted to favorable rather than to unfavorable conditions of weather. Such schedules must inevitably in the winter season be accompanied by the occasional and at times seemingly frequent delays that are the result of our peculiar climate. A return to the old-time practice of lengthening out winter schedules would mean a generally slower speed, but closer adherence to time-tables.

Another disturbing element is the through train that enters the state with a load of tribulation of its own accumulated in other territory, and adds to the unpleasantness in a most aggravating way by disturbing the local service upon our lines. The inability of certain long-distance "flyers" to make their schedule time is historic.

Many weeks ago the frequency of delays in the movement of Boston & Albany trains led the Board to take up the matter with the management and to request a report of delays from all railroads for the month ending December 25. It must be admitted that the period selected is always a trying one on account of the uncertainties of holiday traffic and the sudden changes of weather.

The situation upon the Boston & Albany has been exasperating. Eliminating unreasonable complaints and dismissing the chronic faultfinder and the reckless critic, the official record and the personal experience of passengers justify the indignation which has been expressed. Time-tables have been in a large degree worthless; inquiries of officials as to what train and as to when any train would next arrive or move out have been much of the time to no purpose. In the days of the stage coach such uncertainties were discounted, but in these days they are disastrous to personal comfort and convenience and to the transaction of important private and public business.

In 1900, after a long debate, the Legislature approved the lease of the Boston & Albany Railroad to the New York Central & Hudson River Railroad Company. Men of affairs urged the advantages to be realized through the lease in the development of export and other traffic and a better through connection with western territory, advantages which, it was argued, must be of direct benefit to the commercial interests of Boston and of the large cities along the line of the road. Opponents of the lease predicted trouble in handing over this road to the control of a foreign corporation that might have selfish interests in favoring other commercial centers rather than those in this Commonwealth. The predictions of both classes of prophets seem to have been realized in greater or less degree. This is a day, however, when the obvious and suspected delinquencies of a railroad management, rather than its accomplishments and virtues, are the attractive theme of discussion, and a day of prejudice against what in an unneighborly way is called foreign control. Then, again, the public is apt to be keenly alive to the faults of a new administration and kindly forgetful of the shortcomings of its predecessor. The "good old days" of the Boston & Albany Railroad bring to mind an excellent roadbed, handsome stations, with most attractive grounds, a prosperous management, and that most important feature, an admirable esprit de corps; but it can be recalled that it was an administration which partook of the lassitude that is apt to accompany a large income under comfortable conditions, and that it showed little ambition to develop further a business which was already of pleasing dimensions. It is only just to say that the regime of the New York Central has added many trains, increased facilities for through travel, export and general traffic, and made an outlay in excess of that required under the lease in improvements at East Boston. Nor has it, as often alleged, stripped this road of equipment or enriched itself from the receipts of the line. An inventory taken by the board when the lease went into effect affords us the opportunity for disproving the first charge, and figures furnished in response to our request for information seem to clearly disprove the last charge.

That weather conditions affect train movements; that safeguards against accident interrupt them; that overdue through trains disturb local service have all been noted, but neither singly nor together do these causes fully account for conditions which have existed upon the Boston & Albany Railroad. The company contends that all serious interruptions in its service not explained in the causes above named are due to the unexpected volume of business and excusable lack of equipment and facilities.

Without a shadow of doubt, the immediate management of the Boston & Albany Railroad has been facing a great increase in busi-

ness under an unfortunate combination of circumstances, including insufficient coal and poor coal, lack of engines, track and terminal facilities, as well as difficulties in securing trainmen; but the question is, has the New York Central, as the lessee of this road, upon whose resources the public had a right to rely, really been caught at an untoward time without fault of its own as an unwilling victim of a great flood of business.

About three months ago the New York Central after long negotiation entered into an agreement with the New York, New Haven & Hartford Railroad Company by which large quantities of freight formerly handled by that company would thereafter be daily turned over to the Boston & Albany road. The arrangement was one mutually profitable, and one which would in every way have been desirable had the New York Central possessed or had it provided adequate facilities for carrying it out. As it neither had them nor provided them, the arrangement was one that jeopardized the interests of the traveling public that is dependent upon the Boston & Albany Railroad. In the light of that traffic agreement, it is idle for the company to point to the extraordinary increase in business as an excuse for its failure to furnish proper accommodation. Fuel is the factor of all others with which a steam railroad cannot afford to take chances. In contracting for the year's supply the New York Central dealt with companies along its lines and in part with companies in which it had a proprietary interest and purchased large quantities of coal that had in the market a reputation for inferior quality. The coal companies, presumably not for the first time in the experience of the contracting parties, hurried deliveries to other purchasers, who paid higher prices and postponed railroad deliveries. In consequence the supply of coal on the Boston & Albany at one time was not more than enough to last three or four days. Such a policy, if deliberate, in purchasing coal wantonly trifles with the public interests. It is true that manufacturers have been unable to fill orders for equipment; true that the demand for labor has been greater than the supply, and true that abnormal shipments have helped to congest tracks; but these excuses have been given too often. Patrons have heard too much about cars and engines which have been ordered, but not delivered, and are looking for cars and engines in use; they are weary of listening to vague plans for future improvements. The root of the matter is that in too great zeal for economy the administration has been content to risk the comfort and convenience of the traveling public and has been too slow to appreciate the fact that the maintenance of service and not the maintenance of dividends is to be given the place of first importance and that if a risk is to be taken it must be the risk of a temporary failure of returns upon capital rather than a failure of reasonable accommodations. With conditions and causes known the question is one of remedy. Two paths are open, one pointing to legal proceedings to terminate the lease; the other to an improved service under the lease. In the belief that the latter may well be deemed at this time the better course, we recommend that the New York Central & Hudson River Railroad Company in dealing with the Boston & Albany division abandon hand-to-mouth methods, and adopt a policy of making the expenditures necessary to establish a high standard of train service and to provide the tracks and terminal facilities requisite for the demands of business.

The Boston & Albany Railroad as a great avenue of transportation affording direct communications between the vast territory beyond our state lines and a chain of the most flourishing cities of New England ending with the second port of the country, offers a splendid field for railroad enterprise. The public interests call for a broad and progressive railroad administration and equally for no timid or provincial policy on the part of the state. If our railroads are operated, charges made, accommodations provided, and capitalization restricted under state supervision, it matters little whether it be one or another monopoly that holds stockholding interests. It should simply be made sure that however far the management of affairs extends beyond our borders, within them there is given a public service of the first order. It is such a service that was expected under the lease. The paragraph inserted in the lease to secure it reads: "The said railroad company during the term of said lease shall not diminish or permit to be diminished the facilities for travel for business over the Boston & Albany Railroad or any part thereof, or lower or permit to be lowered the standard of its service as shown in the quality and equipment of its cars, in the construction and care of its stations, station grounds and approaches thereto and in the provisions made for the security and convenience of the public." It is to be regretted that the standard of the future was tied to the performance of the past. Relative merits, too, as a test must become more vague and indefinite as the years go on. Still more unfortunate is this phrase in view of the actual equipment of the Boston & Albany at the execution of the lease. The inventory then taken by the board showed that "of 336 cars then in use forty-seven were of the modern type, 150 modern in construction, but of old pattern in respect to seats, and 169 of an old and unsatisfactory type throughout"; and that "of 248 locomotives eighty were heavy freight and passenger engines and nearly new, seventy-eight were of average character and

ninety were near the end of their usefulness." It cannot be believed that such an equipment was the ideal that was intentionally presented to the New York Central management as the Massachusetts pattern and the goal of future endeavor upon the part of this lessee. But whatever the technical letter of the lease the true spirit of the arrangement and the true understanding between the parties warranted the expectation of a liberal and progressive management of this railroad. That and nothing less is to be demanded.

The United Railways of New Jersey.

BY C. H. CARUTHERS.

The earliest mention of a railroad in New Jersey which appears among the manuscripts at the writer's command is a statement that in 1812 John Stevens applied to the legislature of that state for the necessary authority to build a railroad within its borders. Between whatever points this line was intended to be built, it doubtless was meant to be of the same type as the "tramways" then in use throughout the coal regions of England, and it is scarcely probable that the use of the steam locomotive upon it was contemplated at the time. Following this we find a statement that the portion of the Camden & Amboy Railroad, between Bordentown and Amboy, covering a distance of 26½ miles, was completed and put in operation in 1831. The section from Camden to Bordentown was not finished until the following year, at which time trains began running over the entire line, and from that date the road was the chief means of communication by land between New York and Philadelphia for many years. The traffic was heavy and several serious accidents occurred. Probably the most disastrous was that at Hammill station, near Bordentown, in 1855. A single track only was used, and through a blunder two express trains running in opposite directions were allowed upon that part of the road at the same time. The engineman of the northbound train saw the other approaching and started his train back to reduce the shock, or perhaps entirely prevent it. A physician failed to notice the backing train and drove his buggy on a grade crossing. The rear coach struck the horses and was derailed, the other coaches piling upon it. As a result of the overturn and the collision of the oncoming train which occurred almost immediately afterward, 21 people were killed and 70 were injured.

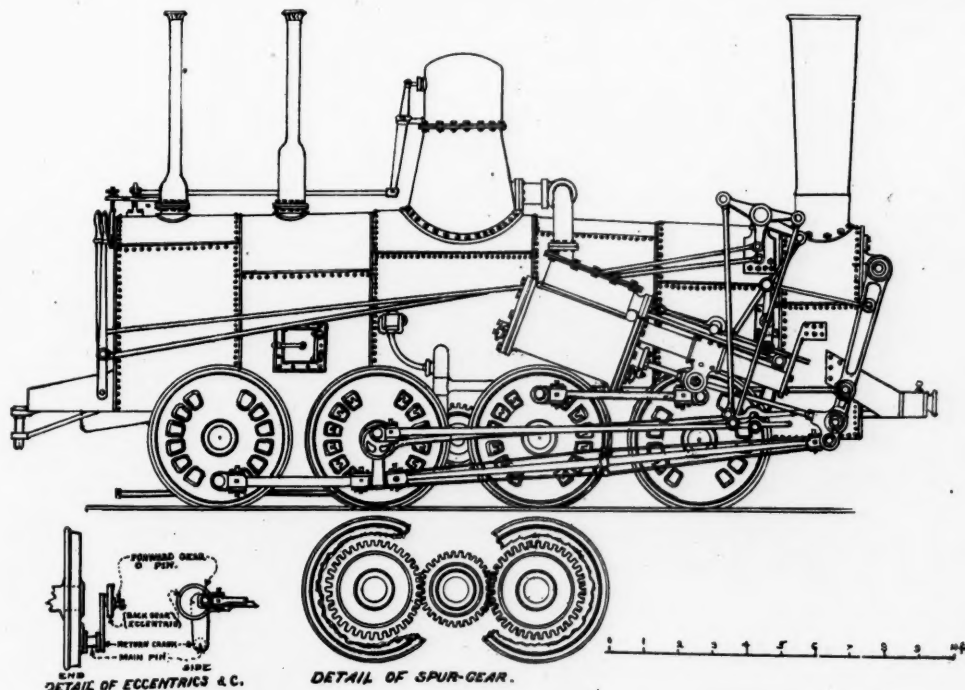


Fig. 2—The Monster; Camden & Amboy Railroad, 1834.

The Elizabeth & Jersey City Railroad is mentioned as having received a locomotive from the Rogers works in 1838, and the New Jersey Railroad & Transportation Company is similarly referred to at various periods from 1837 onward.

It is to be regretted that but little data seem to be attainable of the Belvidere-Delaware Railroad, or the Philadelphia & Trenton Railroad, but as the Camden & Amboy appeared to be that upon which most of the early experimental work in the various lines of

railroad practice was done, it is but natural that these latter roads came into less prominence at that time.

Near the close of the sixties these four roads were combined under the name of the United Railways of New Jersey, and in this combined form were afterward, in December, 1871, leased to the Pennsylvania Railroad Company, since which time they have formed the New York, the Amboy, and the Belvidere divisions of that company.

Through the courtesy of Mr. Andrew Carnegie and of General William J. Palmer, the following letter is permitted to form a part of this article, and in connection with the lease of these roads and their wonderful development since that lease was consummated, is strangely prophetic in view of the fact that it was written in 1859,

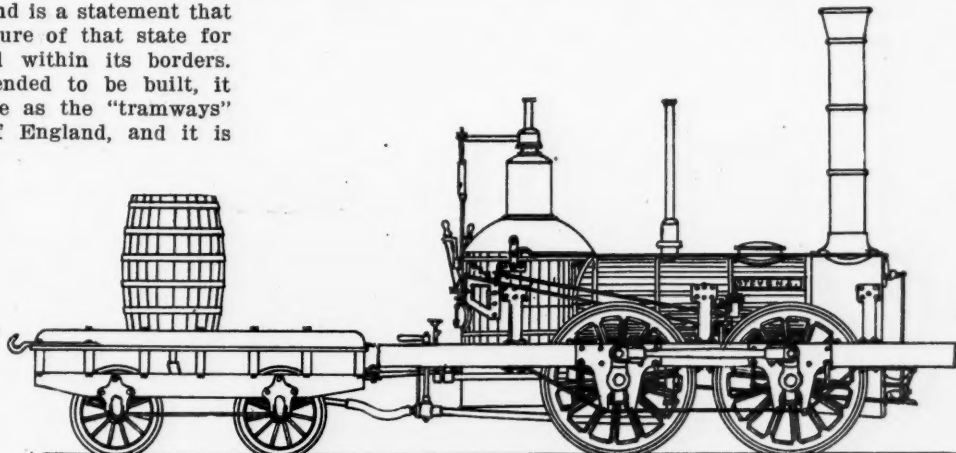


Fig. 1—The Stevens (Re-named John Bull).

As built for the Camden & Amboy Railroad in 1831.

twelve years before this merging of the identity of the New Jersey roads in that of the Pennsylvania:

Altoona, Pa., June 18, 1859.

W. J. Palmer, Esq., Philadelphia.

Dear Sir:—(Here follow some matters not pertinent to this article which are therefore omitted.—C. H. C.)

Much obliged for the "Press" lent me. We shall certainly be able after a while to get a satisfactory line to New York, via the Pennsylvania Central, and Philadelphia, Allentown, or Tyrone. I vote for the former and hope the C. & A. Co. will soon see it to their interest to form a close offensive and defensive alliance with the "Great Provincial."

A proper effort on their part will enable them to secure or rather retain the trade. If it once is compelled to seek other channels, its recovery will be less easy.

Truly yours,

(Signed) A. CARNEGIE.

The equipment, stations, permanent way, and some features of practice of these roads in the olden days differed considerably from the lines followed on railroads to-day. The Camden & Amboy at first used several styles of track, beginning with the wooden rail capped with bar iron and resting on stone blocks. Other sections were of wrought iron edge-rail weighing 36 lbs. to the yard; and at another point iron rails 16 ft. long, 3½ in. high, and 2½ in. wide at the bottom were used. These rails weighed 40 lbs. to the yard. The Stevens "H" and "T" rails were also used. The latter had iron webs riveted to their vertical sections, to enable them to be properly secured to the sleepers. There were no sharp curves on the line, and difficulty found in keeping the first locomotive on the track must have been caused by imperfect alinement.

The station platforms were built on a level with the floors of the passenger coaches, and while awaiting a train at Bordentown in 1900, I was informed that the station house then in use had been built almost fifty years before, and had undergone but few changes in all those years.

Where double tracks existed upon these lines trains were run to the left as in England, and this practice continued for some time after the lease to the Pennsylvania was consummated. At points where the grade crossings were protected by gates, the rather flimsy "safety-gate" as we now see it, was not used, but instead was a heavy framework covered with wide and high palings, and this was raised vertically by hand-controlled mechanism. Some of these gates were in use as late as 1878.

Another feature of the old-time practice of the Camden & Amboy was still followed in the great train shed of the Pennsylvania at Jersey City in 1905, and probably is not yet discontinued. Large baggage trucks or vans are drawn along the platforms by a horse, who performs his duties apparently with an utter obliviousness to the movements of the massive engines filling the shed with the reverberations of their exhaust.

The locomotive equipment of these roads, especially during their earlier days, like that of many other lines of the period, was of a very diversified character. The first engine of which accurate records are preserved is the well-known John Bull, which came to the road from the Stephenson works at Newcastle-on-Tyne, England, in August, 1831, and ran continuously until 1866, is still in running order, and is preserved in the National Museum in Washington, D. C., having been presented to that institution by the Pennsylvania Railroad. Until 1881, at least, it appeared regularly upon the performance sheets of the Pennsylvania Railroad as "601, Stephenson, England." This engine was named "Stevens" by its English

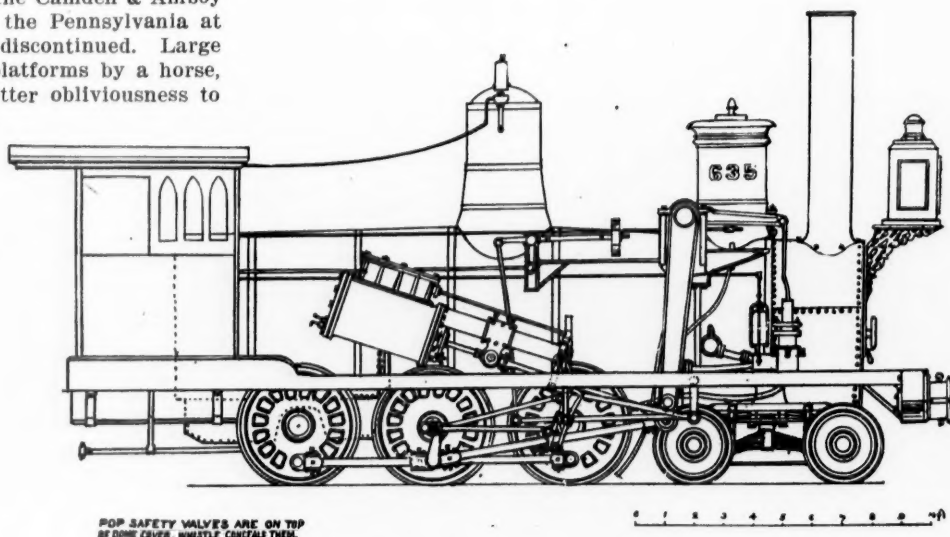


Fig. 3—Rebuilt Monster, 1869.

earlier engines of the line until after 1850. The first tender of the "John Bull" was simply a truck to carry the wood and having an empty whisky barrel set upon it for a water cistern. This was connected to the pump by a leather hose made by a shoemaker. The eccentric rods were carried forward through an opening in the lower part of the smokebox to the front of the engine, terminating at that point in hooks which operated the valves, the stems of the latter, of course, entering the front of the steam chests. At the time of this engine's retirement from active service in 1866 it had a smokestack of about the same type as is shown on engine "Stevens," and retained this when at the Centennial Exposition in 1876.

The "Monster," Fig. 2, was a most remarkable engine. It is alleged to have been built by the Camden & Amboy Company in its shops at Bordentown, N. J., in 1834, and is claimed to be the first locomotive designed especially to use anthracite coal as fuel. The rear two pairs of driving wheels were coupled in the usual manner and driven from the cylinders through the medium of a large rocker to which both the piston and the connecting rod were attached. The forward axle of these two pairs of drivers was provided with two spur-gear wheels

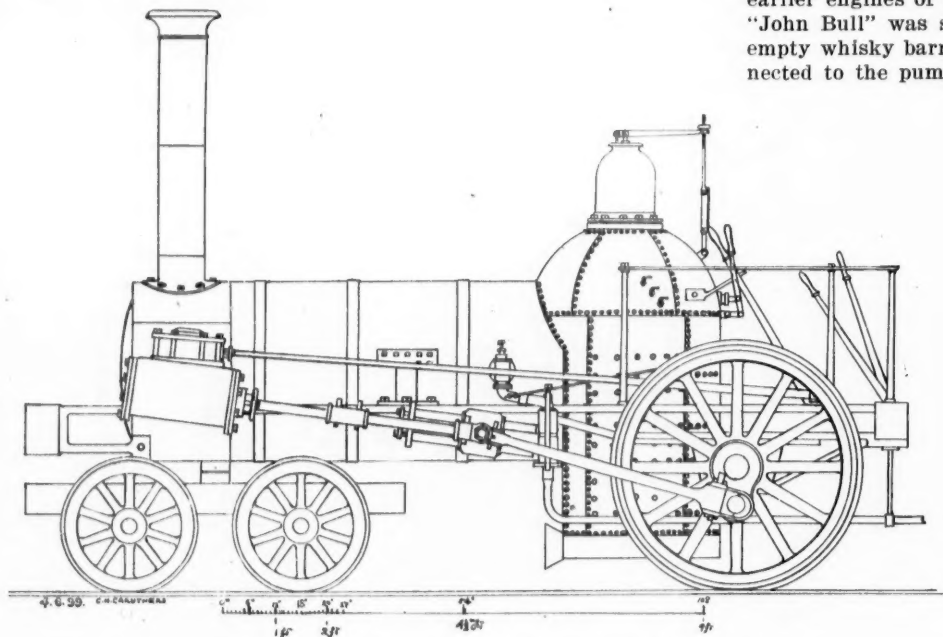


Fig. 4—Black Hawk; Philadelphia & Trenton Railroad, 1853.

builders, but was changed to the more familiar "John Bull" by the Camden & Amboy people soon after its arrival in America, and it is probable that but few have known the original name. Those who have seen it will recall that the dome is an oval affair attached to a saddle at the forward end of the boiler, while a cap is bolted to the hemispherical roof-sheet. Originally the dome occupied this position and the cap was over the saddle referred to, which now carries the dome.

The peculiar truck which was long used at the front of the engine is one of the devices of Isaac Dripps, the master mechanic at the time of the "John Bull's" arrival in America, and was found necessary to enable the engine to pass around the numerous curves of the line instead of accomplishing that part of the trip by way of the Jersey swamps. Mr. Dripps also removed the coupling rods from the drivers, and arranged one wheel of the forward pair in such a manner as to permit it to rotate independently of its mate on the axle. Of course, this arrangement considerably reduced the adhesion and naturally the tractive power of the engine, but it afterward kept on the track and rounded the curves better. Its original wheels were of locust wood centers, with wrought-iron hubs and tires. The latter were shrunk on the wooden felloes in the same manner as a wagon maker shrinks tires on a cart or wagon wheel. No tender came with the engine, and that used in later years was of a type generally seen on the

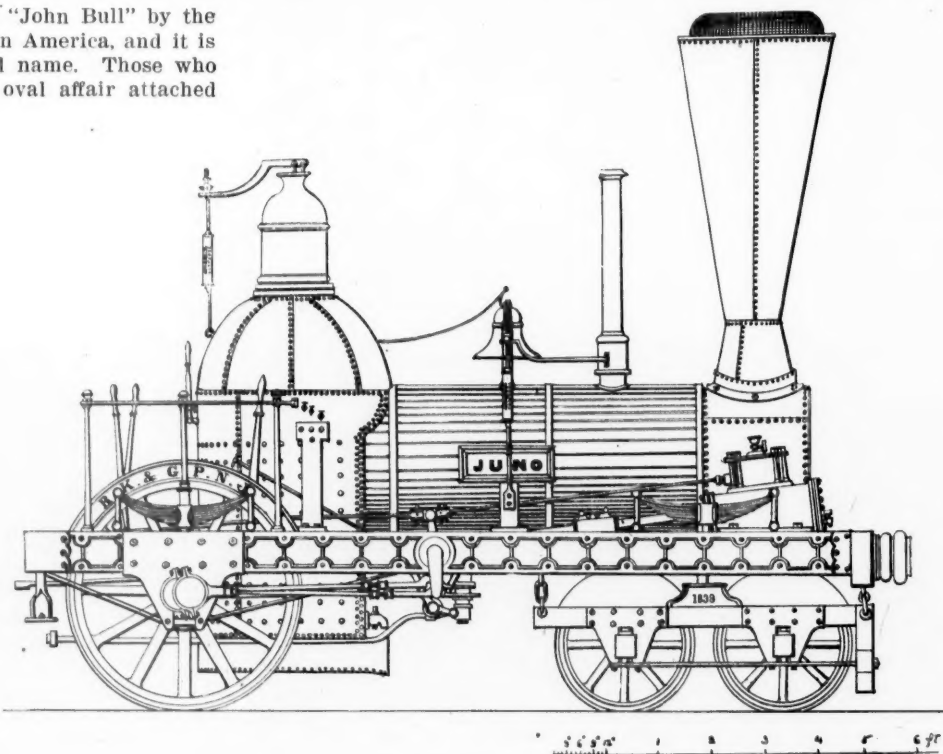


Fig. 5—The Juno.

Built by Rogers, 1839, for the Jersey City & New Brunswick Railroad.

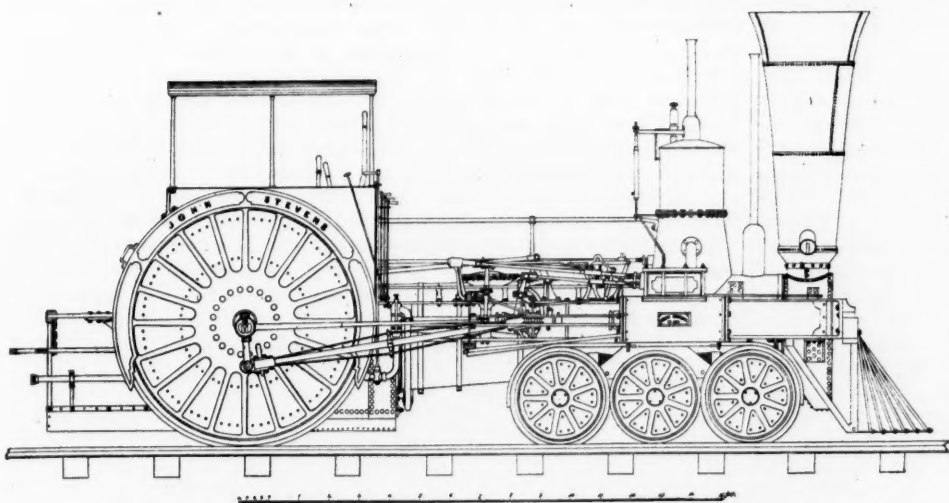


Fig. 6—The John Stevens; Built by Norris Bros., Philadelphia.

which meshed into intermediate spur-gear wheels, and these in turn meshed into two more attached to the rear axle of the forward two pairs of drivers, these also being coupled together by parallel rods. The valve-gear was of the "D" hook type, with independent half-stroke cut-off. The full stroke gear was driven by an eccentric and a pin attached to a return crank on the main pin, as shown, and the cut-off was driven by a rod connecting its rocker to the large driving rocker already referred to. The mode of reversing and of controlling the cut-off will be readily seen in the drawing. The peculiar shape of the top of the boiler will be recognized as practically that of many locomotives of the standard classes now used on the leading railroads of America. The principal dimensions were:

Cylinders	18 in. x 30 in.
Diameter of drivers	48 "
Steam ports	1 1/2 x 10 "
Exhaust ports	2 1/2 in. x 10 "
Travel of valves	4 1/4 "
Flues, number of	135
Flues, diameter	2 in.
Flues, length	130 "
Firebox, width	43 "
Firebox, length	84 "
Firebox, depth	30 "
Total heating surface	745 sq. ft.
Total weight	60,910 lbs.

The original tender was probably of the same design as shown on rebuilt "Stevens," Fig. 7. The rebuilt "Monster" had a tender with two trucks, one of six wheels and one of four, most likely of the same design as those in Figs. 8 and 9. Data in possession of the Pennsylvania people states that the rebuilt "Monster," Fig. 3, was originally built at the C. & A. Co.'s shops at Bordentown, N. J., in 1850, with hook motion, etc., and was rebuilt as shown, in 1869. If this date of original building is correct, it must either have been built on the lines of the "Monster" of 1834, or else the date usually assigned to the building of the first engine of the type is incorrect. One thing rather singular in this connection is that the driving wheels shown under both engines are alike and are of a peculiar type, apparently similar to those placed under three "Phleger" engines built by R. Norris & Son for the Pennsylvania Railroad in 1858, and which I have never found in drawings of engines of earlier date. The rebuilt "Monster" was originally No. 35 of the Camden & Amboy, and was changed to 635 after its transfer

to the Pennsylvania in 1871. Reference to the second drawing of the "Monster" will show that it underwent considerable change in rebuilding. The spur-wheels were removed from the driving axles, and the second, third and fourth pairs of driving wheels were connected by parallel rods, and a four-wheel truck of Bissell type replaced the forward pair of drivers. Gooch links were substituted for the hooks, and I regret that the drawing from which my reproduction was made is not distinct in the point of the connections between the radius bar and the rocker shaft, which, it will be noted, stands directly over the link. It is almost certain that the radius bar was carried forward to a swinging hanger, from which a coupling bar attached to the same pin extended backward to the lower arm of the main rocker; and that the radius bar at the end connected to the link block, was continued backward a sufficient distance to

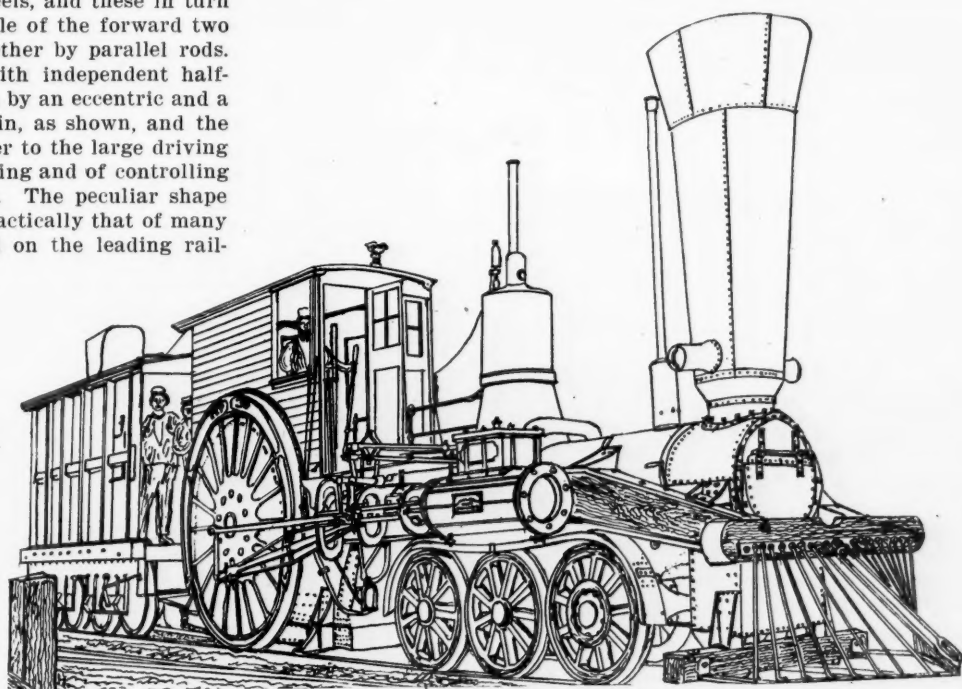


Fig. 7—The Stevens; Camden & Amboy Railroad, Rebuilt 1850.

Built by Norris Bros., Philadelphia, 1849. Cylinders, 13 x 38 in. Drivers, 96 in. Run on passenger train in 1852 with anthracite coal.

be properly attached to the lifting hanger of the reversing shaft.

From the different data at my command, and the record of the Pennsylvania people that 635 was originally built at Bordentown, conflicting with the statement of another that it was built at Trenton by Van Cleaf & Co., it would almost indicate the existence of more than one different "original" types of this engine, or else matters have become mixed up. Be that as it may, there are many similar "ear marks" on each.

The "Stevens" was one of seven built by Norris Brothers, at Philadelphia, in 1850, for the Camden & Amboy. This engine had cylinders 13 in. x 38 in., and driving wheels 8 ft. in diameter. These

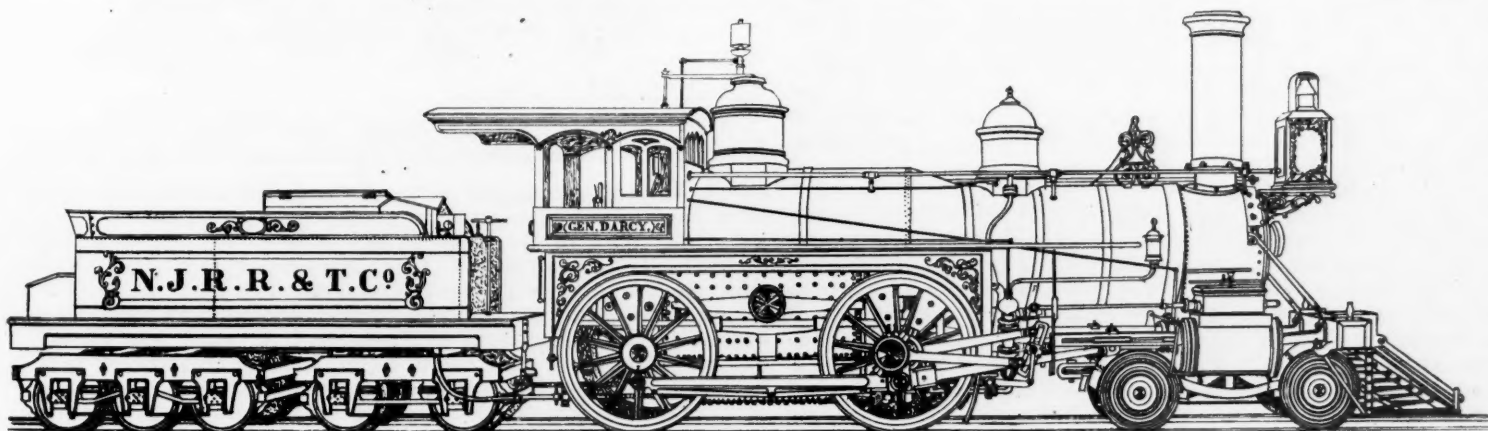


Fig. 8—The Gen. Darcy; New Jersey Railroad & Transportation Company, 1867.

wheels, it will be noticed by reference to the illustration, were of a composite type. The full stroke eccentrics for both fore and back gears were on the driving axle, but the independent half stroke cut-off was driven from a return crank attached to the main pin. The firebox end of the boiler was built with a sloping top to enable it to be carried under the driving axle. Wood also entered into the construction of the frames. It is said that one or two of these engines were fitted with trucks having but four wheels, although the illustration, which is from a copy of the original drawing, shows six, and this number is likewise on the drawing shown of one of the engines after alterations had been made. This latter drawing shows a cab and also some changes in the position of a few of the parts. It also shows a type of tender referred to in the description of the "John Bull."

In 1846 M. W. Baldwin built a passenger engine for the Camden & Amboy which had four driving wheels connected and a four-wheel truck, but with a half-crank on the forward drivers. Its cylinders were 13 $\frac{3}{4}$ in. x 18 in., and the drivers were 60 in. diameter. This was the second engine of the type and it proved very successful.

In May, 1835, the "Black Hawk," Fig. 4, was built by M. W. Baldwin for the Philadelphia & Trenton Railroad. It was the first Baldwin engine with outside cylinders, the first to use an invention of E. L. Miller whereby part of the weight of the tender could be

engines had brass casings on the steam chests and cylinder heads, and the front and back boiler jacket bands, dome casings, edges of running boards, bands covering the joints of the "built-up" sand-boxes, and the hand rails, with their stanchions, were all of brass. The cabs were of black walnut decorated on the outside with scroll-work in gold leaf, and paneled on the inside with alternate strips of chestnut. The wheels were painted vermilion, and the other parts of the engines, as well as the tenders, were black, with ornamental striping, etc., in gold-leaf. Through the courtesy of Mr. J. Sanford, of the Meadows Shops, I am informed that at the time these engines came into possession of the Pennsylvania Railroad the cylinders of the "Darcy" were 16 in. x 24 in., and those of the "Perry" were 15 in. x 24 in., and that the drivers of both were 60 in. in diameter, including the tires. From the drawings showing them as originally built it is evident that those of the "Perry" were 72 in. at first, and must have been afterward cut down. After the union of the roads, the "Darcy" became number 103, and the "Perry" number 115. When they passed into the ownership of the Pennsylvania the "Darcy" was renumbered 703, and the "Perry" 715. The latter company substituted its standard diamond frame four-wheel trucks for those shown under the tenders, and substituted a standard straight stack for that of balloon shape shown on the drawing of the "Perry," but made no other changes of any

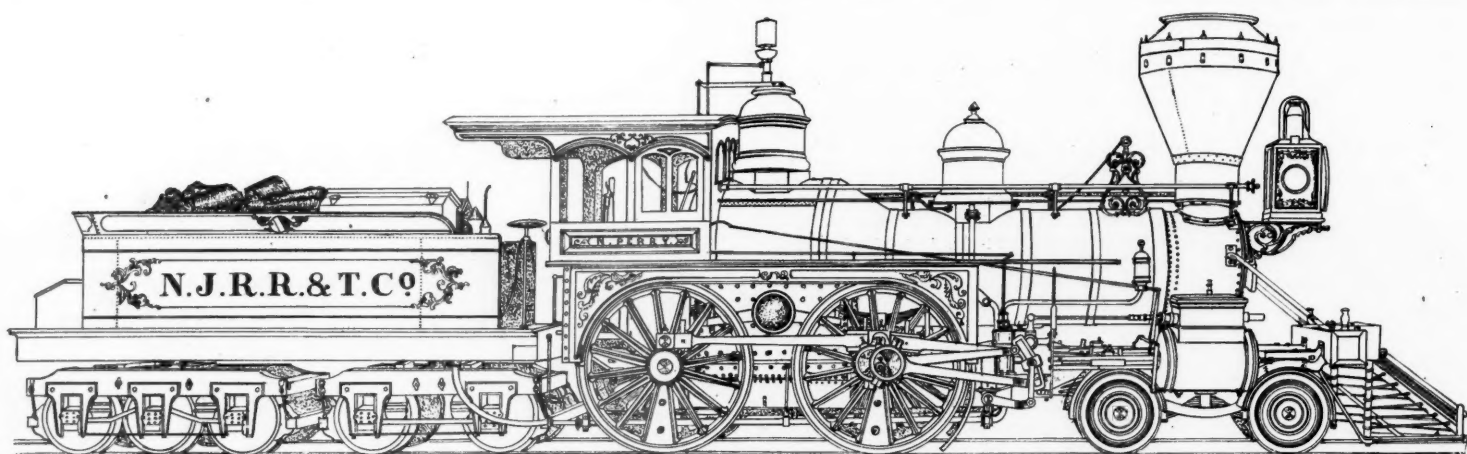


Fig. 9—The N. Perry; New Jersey Railroad & Transportation Company, 1867.

thrown upon the engine when necessary, and bore Baldwin construction number 11. Its valve-gear was under the foot-plate, and both back and forward motion was obtained from the same eccentric. From the time it was placed in service until 1840 it averaged 21,000 miles per annum.

Five locomotives of this type were built during 1835, 1836 and 1837 by M. W. Baldwin for the New Jersey Railroad & Transportation Company, as follows:

Newark (M. W. B. No. 16).....	1835
New Jersey (M. W. B. No. 21).....	1836
New Brunswick (M. W. B. No. 27).....	1836
Rahway (M. W. B. No. 70).....	1837
E. Townsend (M. W. B. No. 87).....	1837

These were all of the type shown in Fig. 4, and in a letter to Mr. Baldwin, dated June 12, 1838, Mr. Sykes, the engineer of the railroad company, pays a high compliment to their merits, and states that they readily draw 20 four-wheel cars containing 26 passengers (probably to each car, although this is not stated) at a speed of 25 miles per hour on grades of 26 ft. to the mile.

In 1837 Thomas Rogers had about completed the engine "Sandusky" for this company when it was seen by some parties interested in the Mad River Railroad, of Ohio, and so impressed itself upon these men that they induced Mr. Rogers to sell it to them and build another in its place for the N. J. R. R. & T. Co. This latter engine was named "Arreseoh," and although heavier than the "Sandusky," was of the same design, Swinburne having prepared the drawings for both engines. The "Arreseoh" was placed in service in 1838.

The "Juno," Fig. 5, was built in 1839 by Rogers at Paterson, N. J., for the New Brunswick & Jersey City Railroad. It is doubtless of the same general proportions as the "Arreseoh," and was of practically the same design.

The two remarkably neat engines, "N. Perry," Fig. 9, and "General Darcy," Fig. 8, which are illustrated in connection with this article, were built at the company's shops at Jersey City, about 1867, from designs by John Headden, who was Master Machinist at that time. Their chief peculiarities consist in the arrangement of the Stephenson shifting links and their connections on the outside of the driving wheels, the trussing of the parallel rods, and the six-wheel truck under the rear end of each tender. The "General Darcy" was used on express passenger trains between Jersey City and New Brunswick, and the "N. Perry" drew local passenger trains between Jersey City, Rahway and Perth Amboy. Both of these

moment. The "Darcy" was cut up in 1882, and the "Perry" in 1877.

In 1863 the Rogers Locomotive & Machine Company built the engine appearing in Fig. 10 for the N. J. R. R. & T. Co. It is generally admitted to be the first "Mogul" ever built, although J. P. Laird had rebuilt the Pennsylvania Winans "Camel" "Seneca," No. 131, at Altoona in 1862, on practically the design of a "Mogul," although he placed the driving wheels all in front of the firebox.

The locomotive equipment of the Belvidere-Delaware Railroad numbered 31 on passing into the hands of the Pennsylvania. Of these, five were built at the Baldwin works, 15 by the "Bel-Del" Company, one by Danforth, Cooke & Co., and two by the Trenton Locomotive & Machine Company. The remaining eight were taken out of service soon after the change of ownership and replaced by

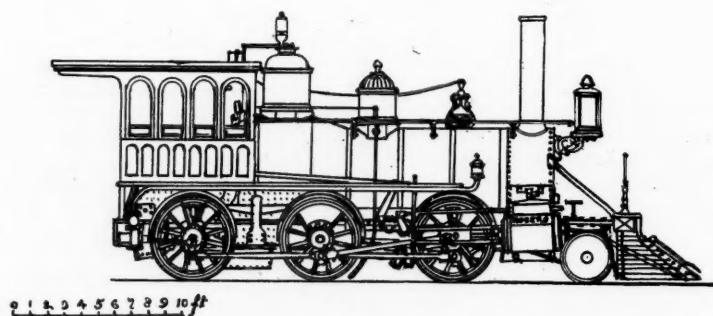


Fig. 10—Mogul, 1863.

Built by Rogers for N. J. R. R. & T. Co.

engines built at Altoona, and while efforts to obtain data concerning them have been unsuccessful, it is more than probable that they were from some of the firms already named. Fig. 11 shows an engine built for this division at the Trenton Locomotive Works in 1855. It had 16 in. x 22 in. cylinders, 60 in. drivers, and outside valve-gear as on the "Darcy" and "Perry," but differing from these engines in using the Gooch, or suspended, link, which was applied to some extent about that time to quite a number of American locomotives. Instead of two eccentrics on the return crank, the "Assanpink" had one eccentric for the top rod, and a pin set in this eccentric to actuate the lower rod, as in the original "Monster." The driving wheel springs were underhung, and those of the truck

seem to have performed the duties of both springs and equalizers. The frames were of the slab type throughout. The engine was named after a small creek at Trenton.

Turning now from the locomotives to the early passenger equipment of these roads, the writer distinctly recalls his first ride over the Camden & Amboy from Philadelphia to New York in 1859, and although but a small boy at the time, was impressed with the light character of the construction of the passenger coaches, as compared with those of the Pennsylvania, upon which he frequently traveled. The windows of these C. & A. coaches were small and the sash containing the glass could not be raised, but the panels between the windows could be opened if fresh air was desired. These panels were not over six inches wide, and effectually prevented any one from putting his head or arms outside of the coach. Some of the cars had windows which could be raised or lowered in the usual

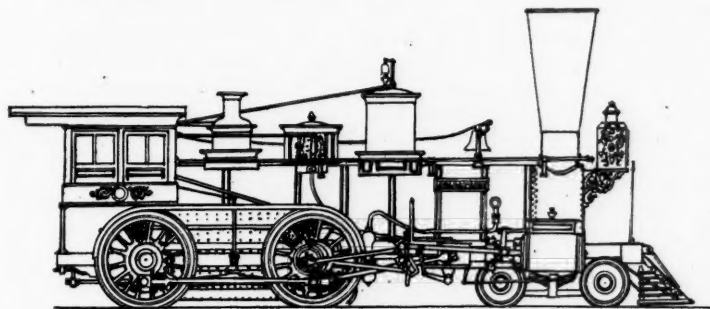


Fig. 11—The Assanpink.

manner, but these, too, were of light construction, and the divisions between the windows were not over four inches wide. No clear-stories were used, but several ventilators were arranged along the center of the roof. From the bottom of each car canvas extended along its entire length and reached almost to the ground. At the ends of the cars other pieces of canvas were so arranged as to be readily attached to the parts already referred to after the cars were coupled together, thus forming a continuous chamber or passageway, for the purpose of collecting the dust raised by the passage of the train, and in dry weather this dust could be seen pouring out in a blinding cloud at the rear of the last coach.

The passenger coaches, and also the freight cars, were built with two huge side-sills shaped like a double-ended sled runner, and very like those of many of the pressed steel cars now used on most of the leading roads. No center or intermediate sills were used, but numerous cross timbers bound the two sides together. An old box car having this type of bottom stood in the Pavonia, N. J., yards, off its trucks, and used as a tool shed only five years ago, and is possibly still at the same place.

The trucks of all these cars were of the wooden frame type, and those for passenger service differed from those for freight only in

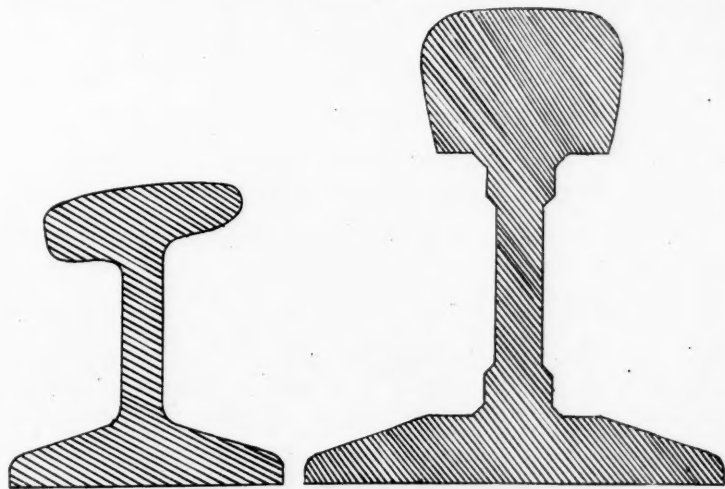


Fig. 12—Old Camden & Amboy Rail After 30 Years' Service (Left); Belvidere-Delaware 72-lb. Rail (Right).

the number and arrangement of the springs. A car inspector who worked for the Erie Railway Company at Jersey City many years ago stated that he was much interested in a type of spring with which the Camden & Amboy people were experimenting at that time, and which, as well as he could recall it, consisted of two hollow cylindrical sections with one end of each closed and of slightly different diameters. The smaller fitted like a piston into the larger, and was provided with a leather packing ring to prevent the escape of compressed air with which the interior of the cylin-

ders was filled. A small quantity of molasses was pumped through the filling plug from time to time in order to assist in keeping the leather packing tight. The device does not appear to have given satisfaction, from the fact that the number in use was not added to, and those referred to were taken out after a prolonged test.

During the trip already referred to, the writer also saw one or two cars which had side entrances in addition to the customary doors at the ends, and is almost certain that the buggy-top arrangement to which more extended reference will be made in the portion of this article relating to the locomotive equipment, was used on at least some of the baggage cars.

The passenger cars which passed from these railroads into the possession of the Pennsylvania at the time the lease was consummated numbered nearly 300, and as many, especially of those received from the Camden & Amboy, were small and of very light construction, these were soon withdrawn from service and taken to Altoona, where they remained on a storage track for at least one year before being cut up. The rest being larger and of modern designs, were easily brought up to the requirements of their new owner, and were retained in service for many years, some being still running as late as 1886. Many of these cars were finished inside in a more costly and elaborate style than the cars of the Pennsylvania in use at that time. Some had six-wheel trucks, and many of the four-wheel trucks had the side-bearings arranged on the outside of the truck frame in a manner somewhat similar to that recently applied to several Pennsylvania passenger coaches.

The use of small cars for baggage and express goods, made of such form as to enable several to be placed on a flat-bottomed car and taken in the trains along with standard baggage cars, was at one time followed on some of the roads, and probably is possessed of some merits.

The closer contact of officials and employees in those earlier days appears to have in many instances formed very close friendships between these two classes of railroad men. This was strikingly evidenced as I rode from New York to Philadelphia on a September day in 1878. Superintendent G. W. Barker had just



Old Stone Block Structure.
Camden & Amboy Railroad.

died, and almost every employee one met seemed deeply affected, as much, indeed, as if a loved member of his own household had passed away. Doubtless this friendly relation added to the marked loyalty of the employees to the company during the troublous times of the preceding year, which culminated in the riots and destruction of property at Pittsburg, Pa.

The names which stand out most prominently in connection with these roads are John Stevens, Robert L. Stevens, and Isaac

Dripps. It seems singular that so prominent an engineer as Alexander Holly does not figure in their development, but the only mention of him found among the data collated for this article is that upon one occasion while working in the locomotive shops at Jersey City he laid a wager with a fellow-workman that he would run an engine one mile over the meadows without steam, fire, or water, on condition that no other person be allowed on the engine with him at the time of making the experiment. Permission to use an engine which had just been thoroughly overhauled and had the boiler empty, was obtained from the officials, and attaching a "live" engine to it, he was hauled some distance over the meadows, and then uncoupling from the engine drawing his "dead" one, he ran his mile back toward the shop without any trouble and won his wager. He had allowed the engine to be drawn with the links reversed, and the throttle and cylinder cocks open, thus filling the boiler with sufficient compressed air to enable him to make his run. It seems strange that so bright an intellect was not led, from the result of this trial, to consider some of the uses to which compressed air is now put in railroad practice.

In addition to the gentlemen already named in this article, much of its interesting matter is attributable to the courtesies of James White, a former employee of one of these old railroads, and to Mr. Herbert T. Walker, all of whom kindly permitted the use of interesting data and drawings.

Pensions on the Intercolonial.

A pension system or, as it is called in Canada, an annuity fund, will be put in force April 1 on the Intercolonial and the Prince Edward Island railroads, the Government lines of Canada. One and one-half per cent. each month of the wages of all officers and employees must be contributed toward the fund. These payments

are compulsory except in the case of the employees who come under the civil service act. The fund thus acquired, which may also be added to by contributions of the Government out of the gross earnings of the roads to an amount not exceeding \$100,000 annually, is to be handed over to the Crown. Interest will be paid on it at 3 per cent. A board, made up of the general manager, two chief officers and two members elected by the employees, will control and administer the fund through the Minister of Railways.

This fund will be available for a number of different classes of employees as follows:

Class A.—Those who are 70 years old and have been at least 15 years in the service.

Class B.—Those who are between 61 and 69 years old, have been at least 15 years in the service and have become mentally or physically disabled or incapacitated.

Class C.—Those who are 65 years old, have been at least 15 years in the service and have requested to be retired.

Class D.—Those who, having been at least 25 years in the service, are permanently disabled.

Class E.—Those who, previous to the operation of the act, entered the service at an advanced age and reached the age of 70 years, after having been 10 years, but before having been 15 years in the service.

No pension will be paid for any service less than 10 years, and no new employee can join the fund who is over 35 years old. The pension is computed on the basis of the average monthly pay during the last 10 years of service, but not including in this average service at an age older than 70 years. No pension of less than \$20 a month shall be paid, nor shall any employee receive more than two-thirds of his average monthly pay for the 10 years immediately preceding retirement. To qualify for joining the fund six months' probation and a medical certificate are necessary. Those who fail to pass the requirements will have their contribution refunded. Men who voluntarily retire or have been discharged for cause cannot participate in the pension fund. The board can contribute to a beneficiary one-half of what a contributor paid into the fund in case of the death of an employee who had paid continuously for 10 years. In the case of any employee discharged for the good of the service the amount paid in, without interest, can be paid back. A life insurance fund and a disability fund are already in operation on the Intercolonial. It is provided that employees must drop the disability fund as soon as the new system goes into effect. The monthly allowances paid under the act shall not be alienated or liable to attachment or seizure by any legal process whatever.

December Railroad Law.

The following abstracts cover the principal decisions in railroad cases handed down in December by the United States Supreme Court and the other federal courts.

Release of damages.—A person injured in a railroad accident accepting a sum of money and signing a written release of damages to the company without reading it is negligent and cannot afterwards go into court and have the release set aside on the ground that the contents were misrepresented to him unless he can show some good reason for his failure to read the document or have it read to him before he signed it. *Heck vs. Missouri Pacific Railway Co.*, 147 Rep. 775.

Jurisdiction of Federal Courts.—A railroad company organized under the laws of another state which can be sued in the courts of the state where operated only in counties in which it does business, cannot be sued in a federal court in such state unless it does business in some one of the counties within the territorial jurisdiction of the particular federal court. *Kibbler vs. St. Louis & San Francisco Railroad Co.*, 147 Fed. Rep. 879.

Crossing accident.—A traveler at a highway crossing struck by switched cars with knowledge that no flagman was maintained at the crossing cannot claim that the railroad company was negligent in not maintaining a flagman since in his case he was not misled thereby. In such a case it was held proper to admit in evidence the admission of the injured person that he was wholly in fault in that he thought he would be able to get across the tracks ahead of the cars. *Chicago, Milwaukee & St. Paul Railway Co. vs. Clarkson*, 147 Fed. Rep. 397.

Negligence in construction of side tracks.—It is held by the Circuit Court that the fact that a passing track at a railroad station is not so constructed as to take a rapidly running train in safety does not of itself alone conclusively show negligence in the construction of the track if it further appears that the track was safe for trains under control and moving slowly. *St. Louis & San Francisco Railroad Co. vs. Bishard*, 147 Fed. Rep. 496.

Inspection of hides before transportation.—The New Mexico statute which prohibits carriers from accepting uninspected hides for transportation beyond the limits of the territory is held a valid exercise of the territorial police power and not a violation of the commerce clause of the federal constitution since there is no con-

gressional legislation on the subject. *Territory of New Mexico vs. Denver & Rio Grande Railroad Co.*, 27 Sup. Ct. Rep. 1.

Repeal of tax exemption.—A repealable exemption from taxation of the property of a railroad company is repealed and withdrawn by a statute which expressly declares that the property of every railroad shall be assessed for county and municipal purposes. *County Commissioners vs. Bancroft*, 27 Sup. Ct. Rep. 21.

Construction of railroad as consideration for conveyances.—A condition in a conveyance of mineral rights in lands that the conveyance shall be void if the construction of a railroad to be built as part consideration for the grant is not commenced within a certain time does not require that the railroad shall be built on any particular line or even by the grantees in the conveyance. It is sufficient if the road is built into the territory by any one near enough to the lands to offer reasonable facility for the shipment of the mineral to market. *Wilmore Coal Co. vs. Brown*, 147 Fed. Rep. 931.

Priority of claims in a railroad foreclosure sale.—An interesting case relating to the priority of claims or foreclosure has just been decided by the Maryland Circuit Court. A railroad mortgage provided that in case of default a trustee representing 50 per cent. of the bondholders should take possession and operate the road or sell as directed. Upon the company's becoming insolvent a committee representing nearly all the bond and stockholders was appointed, being given the authority and power that the trustee under the mortgage would have had, on default, which default occurred shortly after its appointment. A sale was negotiated and consummated by the means of a friendly foreclosure suit, the bond and stockholders transferring their holdings to the purchasers to be used in the payment, receiving stock in the new company therefor. The court held that indebtedness incurred by the committee for supplies, advertising and operating expenses, after the bondholders might have taken possession by the trustee, were prior in equity to the mortgage debt and entitled to priority in payment from the property and therefore to be paid by the purchasers. *Queen Anne's Ferry, etc., Co. vs. Queen Anne's Railroad Co.*, 148 Fed. Rep. 41.

Train Loads.

Our attention having been called to an error in the train load table published in the *Railroad Gazette* last week, a new table has been prepared, as below. Owing to certain changes in the form of computation, the Louisville & Nashville has been substituted for the Northern Pacific, affecting the totals, but making the comparison through a series of years more accurate.

Revenue Train Load, Tons.

	1906.	1905.	1904.	1903.	1902.	1901.
Atchison, Topeka & Santa Fe.....	307	282	270	280	248	243
Baltimore & Ohio.....	420	399	401	416	407	375
Buffalo, Rochester & Pittsburg.....	525	507	439	442	424	406
Chesapeake & Ohio.....	586	557	508	493	509	511
Chicago & Alton.....	381	347	336	361	316	288
Chicago, Burlington & Quincy.....	365	327	278	266	219	178*
Chicago, Milwaukee & St. Paul.....	282	265	245	244	254	237
Erie.....	455	412	400	406	377	375
Great Northern.....	530	523	447	447	418	381
Illinois Central.....	353	319	278	288	275	235
Lehigh Valley.....	504	501	486	486	467	464
Louisville & Nashville.....	231	229	234	231	231	222
Minn., St. Paul & Sault Ste. Marie.....	329	309	301	305	315	314
St. Louis & San Francisco.....	214	200	200	195	187	188
St. Louis Southwestern.....	280	267	254	252	232	210
Union Pacific.....	510	507	451	403	418	366
Wabash.....	348	299	286	302	285	283
Average for 17 roads.....	389	368	342	342	328	310

*Estimated.

Government Investigation of Terra Cotta Collision.

The disastrous rear collision on the Baltimore & Ohio at Terra Cotta, D. C., December 30, was reported in the *Railroad Gazette* of January 4, page 12; but the number of persons killed was overstated. The number of casualties is now given as 43 killed and 67 injured. The Interstate Commerce Commission, acting under the Mann resolution, passed by Congress last June, has begun an investigation of the accident, and we give below an abstract of the testimony taken on the first two days of the hearing. The principal facts in the case are as follows:

The stations involved are, beginning on the west:

Silver Spring, day and night block office.
Takoma, 1.2 miles, day block office.
Terra Cotta, 3.2 miles (point of collision).
University, 4.3 miles, day block office.
Q. N., 5.3 miles, day and night block office.

The grade is descending at the rate of 1 per cent. from near Silver Spring to Terra Cotta. Passenger train No. 66 was just starting away from Terra Cotta and Extra, No. 2120, following, ran into it at high speed, wrecking all of its three cars; yet 2120 was not much damaged and the engineman and fireman were not injured. The fog was dense and neither man on 2120 saw the tail lights of No. 66. The engineman of 2120 claims that the signal light at Takoma was not burning, while the signalman claims that it was

burning and showing red. At Silver Spring No. 66 received a "double green" signal, indicating that a crossover in the block section was being used. As there is no crossover between Silver Spring and Terra Cotta this signal would indicate that the signal given at Silver Spring was intended for the block from Silver Spring to University. The testimony of the signalman at Silver Spring is, however, not yet taken. The engineman of 2120 asserts that he received the "double green" signal at Silver Spring, but the signalman has testified before the coroner that he gave a white signal.

There is conflicting evidence as to the time, the engineman of No. 2120 claiming that the collision occurred at 6.38, while other witnesses give the time as 6.35. The trains had started from Washington Junction, 35 miles west of Silver Spring, a considerable time apart, but Extra 2120, having no stops to make, gained on No. 66.

TESTIMONY.

Train Dispatcher Dent.—I have been dispatcher at Baltimore five years and was a telegraph operator eleven years before that. Was appointed dispatcher by the chief dispatcher on recommendation of dispatchers who had worked with me. My territory includes 83 miles of line, of which 16 miles is single track. I work from 4 p. m. to midnight; have a copying operator, who works 12 hours daily. Operators are examined as to proficiency, sobriety, etc., by the division operators. In Maryland now block-signal operators work only eight hours a day, this being the limit under a law passed this year. Formerly they worked twelve hours, except at busy stations.

On the day of the collision engine 2120 had a train of eight empty passenger cars from Cumberland and was bound for Baltimore via Washington. From Washington Junction, about 40 miles west of the point of collision, Nos. 2120 and 1865, the latter a freight train, ran on orders as extras and were directed in the order to "follow each other carefully under green signals," this meaning that they were to expect permissive signals at the block stations. At Tuscarora No. 1865, being a heavy freight, was passed by 2120. Asked why the order should say "follow carefully" when the green signal itself gave that indication, witness said he did it to make the matter more plain to the men in charge of the train.—I issue 35 or 40 train orders a day. There is one woman operator on the division. Takoma is open from 6:30 a. m. to 6:30 p. m. University is open from 7 a. m. to 7 p. m. After 7 p. m. there is one block from Silver Spring to the next station beyond University.

Extra 2120 passed Takoma about 6:31 and the signalman's report that the train had passed a red signal reached witness about 6:40. The operator, when asked why he did not report more promptly, replied that he went outside to see if the train had come to a stop beyond the station. The operator said he had witnesses that his signal light showed red.

Asked as to why he did not run extra 2120 ahead of regular train 66 from Washington Junction, witness replied that this would have delayed 66 about seven or eight minutes, and, 2120 being an extra, the ordinary procedure was to keep it entirely out of the way of passenger trains, except in case there should be some special necessity for doing otherwise.

Should extra 2120 look for a signal at North Takoma after 6:30 p. m.? A. Where signals are irregular, a train must stop and find out what is the matter. The rules require enginemen to "keep a constant lookout for signals." There is no rule which allows an engineman to disregard a red signal at North Takoma at any hour of the night.

Engineman Vermilion.—I have been in the service of the company 36 years. I was on regular passenger train No. 66. I received at Silver Spring a double green signal. A green signal is a permissive block. A double green, which at night is shown by a green lantern hung on the signal post some eight or ten feet above the ground, beneath the regular green light, indicates that a train must be expected at a cross-over within the block section. There being no cross-over between Silver Spring and Takoma, I concluded that Takoma was closed for the night. At Takoma, however, I received a white signal, showing that the obstruction at the cross-over, if there had been any, was removed. It was quite foggy on the night of December 30. A red light could probably be seen two engine-lengths. I was surprised to find the Takoma block station still open. Asked if he would have looked for a signal there in case he had been running a train not scheduled to stop, he replied yes, for the reason that it was proper to observe caution in a fog. Witness thought that the engineman of 2120 should have looked for a signal at Takoma if he had received double green at Silver Spring; this because of the fog and because of the general necessity for cautiousness.

The three cars of my train were vestibuled; I think they had recently come out of the shop. With double green shown at Silver Spring, it would be necessary to approach Terra Cotta under control, because there is a cross-over there. I watched for the signal at Takoma because I always watch every telegraph office. Witness had never known of any accident from the failure of the block-signal operators to give correct signals. He had never received an incorrect signal. Asked if enginemen ever ran by red block

signals, witness replied yes. How far? A.—Sometimes to the next station. Witness had never run past a red signal. If he did he would expect to be summarily dealt with. Asked if he had heard of operators giving false clear signals, he replied that he had. On cross questioning witness could name no instances of either of these errors, but finally recalled one case, three or four years ago, where a certain engineman was suspended for running by a red signal.

Fireman Crawford, of No. 66.—I have been in the service three years. It is my duty to see signals at block stations and speak to the engineman. I saw double green at Silver Spring. [This witness showed imperfect knowledge of the signal indications, but seemed to understand that "double green" indicated that the road was clear from the block station to the first cross-over.]

Trainmaster Kelly.—Have been trainmaster 20 months; before that was chief clerk to the general superintendent, and farther back was assistant trainmaster at Cumberland. New brakemen are required to run three or four trips to learn the road, and then are examined on whistle and hand signals, and on location of switches and stations. New men are examined by the trainmaster or the assistant trainmaster, but no record is kept of the examinations. Inquiries are made by letter of persons to whom applicants refer.

If a trainman has worked excessive hours, the question of whether he must lie off for rest is decided by the man himself. If he says that he cannot run because he is tired, he is excused. We try, however, to keep a check on the men and see that they do not run too hard; but with a large force this is difficult. We do not re-examine brakemen from time to time, but we keep informed of a new man by inquiry of the conductor with whom he runs. On freight trains the conductor should see block signals; on passenger trains also, if not busy. This is the practice. Enginemen are to sound one long blast of the whistle approaching every block station, and on receiving a "proceed" signal answer by giving one short and one long blast. The double green signal means that a train may be found anywhere in the block. If, at Silver Spring, about 6:30 p. m., an engineman received double green and did not wish to run under caution, he should stop and ask why the double green was shown. A single green could not have been accepted by No. 66, because passenger trains are not allowed to follow another train into a block when the leading train may be anywhere in the block. At 6:28 double green at Silver Spring would be improper, but the engineman would not, by accepting it, be relieved of observing the signal at Takoma. No. 2120 could accept single green at Silver Spring.

Harry H. Hildebrand.—I was engineman of 2120. Am 38 years old. Have been in the service 18 years, about eleven years as engineman. Was examined on the rules when promoted and had eyes examined about two years ago. Am an extra passenger runner. My longest trips are from Baltimore to Cumberland, usually taking about 24 hours, including a layover of 6, 8 or 10 hours at Cumberland. The average is perhaps six hours.

(The testimony of this witness showed that in the 48 hours preceding the collision he had been on duty 40 hours and had slept only 8 hours; and if he had finished this trip he would have been out two or three hours longer. The times were approximately as follows: Left Baltimore for Cumberland Friday night about 6:30—having been out of bed since 9 or 10 a. m.—stopped several hours in Washington and reached Cumberland about 5:30 a. m. on Saturday; slept from 7 a. m. to about 11 a. m., and about noon started back for Washington, empty, reaching Washington at 9 p. m. On the way was asked if at Washington he would be prepared to turn back for Cumberland, and replied that he would; that both himself and the fireman were in fit condition to run. He lay over in Washington about three hours—9 p. m. to midnight Saturday—and then started with a passenger train on his second run to Cumberland, reaching there about 5:30 a. m. Sunday, the same as on Saturday. He again slept from 7 to 11 a. m. and then started with the train of empty cars for Baltimore via Washington, reaching the point of collision at 6:35 or 6:38 p. m.)

At Silver Spring I received the double green signal. It was 6:31. As North Takoma at that time should be closed, I understood this to mean that the block extended from Silver Spring to University. I am sure it was 6:31, for I looked at my watch. The speed at Silver Spring was 18 to 20 miles an hour. (The grade from Silver Spring to Terra Cotta is descending most or all of the way at about 53 feet per mile. The witness' testimony as to the speed and the density of the fog was confused and uncertain, but he claimed that the fog was very dense and that the speed was around 25 miles an hour most of the way.)

I sounded the station whistle at Takoma, but saw no light. Asked why he sounded the whistle, witness replied because it was a passenger train. The semaphore at Takoma is on my side—on the right-hand side for eastbound trains. The light being out, did you see the semaphore arm? A.—I saw nothing. Q.—Did the fireman look? A.—He did not say. The air worked well all the way down the grade. My engine struck passenger No. 66 before either I or the fireman knew there was anything in

the way. (That is to say, neither of them saw the red tail light.) Being asked if he applied the brakes, witness answered that the brakes applied themselves by the breakage of the air-pipe on the front of the engine. Asked why he was not going more slowly at Terra Cotta, where there was a cross-over, at which he should have been expecting a train, witness replied that a train using the cross-over "had a right" to protect itself by flag and torpedo. Witness believed he was going 20 to 22 miles an hour when he struck the other train. Why did you not go slower? A.—Because I encountered no flagman at the proper distance back of the cross-over.

Asked as to his previous record, he said that he was suspended 30 days, three or four years ago, for not coming to a full stop when he passed a single torpedo. His engine struck the rear of a preceding freight train. The flagman who had put down the torpedo had gone to sleep. I have been suspended 30 days at other times, and once 60 days, when my crown sheet became loosened. Last suspension about two years ago. I never drink while on duty and have drank nothing since Christmas, though I take a glass of whisky now and then. Witness averred that he was not asleep on his engine. He was in good health or would not have responded affirmatively when asked at Washington Junction Saturday afternoon if he was fit to go back to Cumberland that night. Asked if surprise checking was practiced on the Baltimore & Ohio, witness had never heard of any. Asked his opinion of the block system, he believed the automatic signals recently put in use between Baltimore and Relay safer than the system in use between Washington and Washington Junction.

Cross-questioned about his hours of work, witness said that he had had a good night's sleep Thursday night and arose about 9 or 10 o'clock Friday morning; started out about 6 p. m. Did you not know that train 66 would be behind time on Sunday because of making 16 more stops than on week days? A.—They had a right to notify me if 66 was late. Asked about the possibility of passing a red light at Takoma in a dense fog without seeing it, witness simply reiterated his assertion that he saw nothing. Asked if he spoke to the fireman about the absence of a signal at Takoma, witness replied that he did not; did not speak with the fireman at all there. There is no rule requiring me to speak to the fireman at block signals. The second green light used for the "double green" is neither stronger nor weaker than the green semaphore lamp. Engine 2120 has a high boiler so that the engineman can see only high objects on the left-hand side of the engine. At Cumberland my watch was 15 seconds slow as compared with the conductor's. I do not know of any standard clock at Cumberland. Have never heard of an engineman going to sleep on duty in his cab. The request on me Saturday night to double back to Cumberland came to me from the dispatcher's office through Operator Fisher; I do not know whether there was any signature to the communication. I have refused to work because tired, but not recently; perhaps seven or eight years ago. When on freights I sometimes went out against my inclination because the caller would say there were no other men available. This has not happened in the last four years, with any runner, so far as I know. Freight runs between Baltimore and Cumberland take one or two days.

On cross-examination witness had to acknowledge a rule in the book requiring enginemen and firemen to communicate with each other at signals, and also that he should have known of and used a standard clock in the dispatcher's office at Cumberland. Rule 3 requires the condition of watches to be recorded on a "prescribed form," but witness had never heard of any prescribed form.

Fireman McClelland.—I am 26 years old and have been in the service three years. I saw the order given to Engineman Hildebrand at Washington Junction. It is my duty to see all orders given to the engineman. I keep a lookout for block signals. Asked if that was required by rule, witness did not know. Does the engineman speak to you, in case you neglect to call out the signals? A.—Yes. At Silver Spring I saw the double-green signal. It was on my side of the track. I looked for the signal at Takoma, but saw nothing. Q.—Why did you look? A.—I always look when the engineman blows his whistle for a station. Q.—How far could you see one of these block signals in a dense fog? A.—About six car lengths. Asked about the time that he left Silver Spring and other places, witness gave the same times as those given by the engineman, and said that he did not look at his own watch. The air-brakes were in good condition on that trip. I had not run with Hildebrand lately, except on this trip and the one before it. Ran with him a few times some months since. At Cumberland, when I went to sleep at about 7 o'clock Sunday morning, I knew that our engine would be the fifth one to be called. Q.—Were you asked if you were in good physical condition? A.—No. When running an empty engine, whom does the engineman compare watches with? A.—With the brakeman, I suppose. Witness proved to be ignorant of the rule about comparing watches, and of some of the block signal rules. Witness had refused on a few occasions to go out on a run because he was tired. Q.—Were you punished for not going? A.—I always went.

Cross-questioned by counsel for the road, witness said that at Cumberland the road foreman of engines told both Hildebrand and himself that if they were not fit to run through they should lie off at

Cumberland and not have to give up their engine at some point along the road.

Milton W. Phillips.—I am telegraph operator and station agent at Takoma. Have been there 3½ years. I am married and live half a mile from the station. Q.—Do you drink? A.—Not as a rule. I take whisky perhaps once a week. The gateman at the street crossing, who helps me handle freight and mail bags, and, when necessary, with baggage, is 53 years old, and works on six days in the week from 8 a. m. to 11.45 p. m.; on Sunday he works from 8 a. m. to 10.30 p. m. My pay is \$52.50 monthly, and the gateman's \$41. I have 15 or 20 express shipments daily. The total number of regular passenger trains passing my station during my hours—6.30 a. m. to 6.30 p. m.—is about 22; and freight trains average six a day. My office is in the station, on the ground floor, and the semaphore signal is immediately in front, the post being set in the platform. From 6.30 a. m. to 8 o'clock I have to attend the gate at the street. I cannot recall that my lamp ever was blown out by the wind. The rule to get good-night from the despatcher before leaving the office is not strictly lived up to. On December 30 the last train preceding No. 66 was No. 6, due at 4.27 p. m. Questioned about the lamp in his signal, witness said that immediately after it had been disregarded by Extra 2120 he walked up the track 38 yards and looked back to see if the signal could be plainly seen. It was unmistakably visible at that distance. Ordinarily the signal lever has to be held in the clear position until the train has accepted and used the signal; the lever, however, can be fastened in the all-clear position, and at night it is so fastened.

Detailing his operations on the night of the disaster, witness said that about 6.26 he reported train No. 66 to the stations both west and east of him; and the station on the west, Silver Spring, in acknowledging this, said "Extra next." I replied "66 last." I had already put the signal red behind train 66. Silver Spring then said "Extra 2120 east at 6.28." About 6.31½ I heard 2120 coming; it went by very fast, and I went out on the platform; by the time I got there the train had gone by. I went back and asked University if 66 had arrived, telling him that 2120 had gone by "running like hell." I had not heard this train whistle. Q.—Had the gate been put down for 2120? A.—I do not know. A visitor, H. E. Page, a former operator, was in the office at the time. His presence there, the witness admitted, was against the rules. The clock in the station office sometimes is two minutes out of the way. It is not subjected to any official examination, so far as the witness knew. He sets it every noon by Observatory time, if it is much out of the way, and if he is in the office. At 6.34 I entered No. 2120 on the sheet as passing at 6.31. I did not enter the time at first, because I thought the train would stop and back up. Witness had never known the signal lamp to fail. He was facing the track when No. 2120 passed. Asked if he was surprised at the high speed of the train, witness said that sometimes trains went past his station a long distance, perhaps a half-mile, and then backed up. This has happened times "too numerous to mention." I do not report the men in such cases, because I never knew any rule requiring it. If the men in charge of the train endeavored to stop, and came back and found out whether the signal was clear, I deemed that a proper compliance with the rules. Under the rules local passenger trains may at any time disregard a stop signal sufficiently to make the stop opposite the platform, where passengers usually board the train. Asked why he did not run after and try to stop No. 2120, he replied that he could not think but that the train would stop and come back. I did not report to University the time that the train had passed. I told him the time later. I did not see markers on 2120. Q.—Did you see markers on No. 66? A.—Yes. I was called to Baltimore to attend an investigation by the Superintendent on the night of January 1. The double green signal could not apply to any part of the road in this vicinity except at Terra Cotta, as that is the only station with a cross-over.

Cross-questioned by the counsel of the road, witness replied that he had never asked for a better clock. Q.—Did you see signals on the front of 2120? A.—I did not; I was not expecting him to go by my station so fast. Q.—Why did you not use torpedoes to stop 2120? A.—I never knew a case where a block signal was not sufficient. Q.—Did you ask Page to go out and look at the light? A.—I did not. I am quite sure that in going out the 38 yards I went alone. Gateman Lempke had also seen the red light. Q.—What did you say to him? A.—I told him that I was glad of that. Asked to affirm definitely that the lamp was not changed in any way after the accident, witness said that it was not in any way changed after the accident until about 2 o'clock on Monday morning. Asked again about trains disregarding his signal witness said the cases were too numerous to specify. On cross-examination, however, witness could not name any date on which such an occurrence had taken place within two weeks, although he felt sure that 25 such cases had occurred in the two years that he had been there. Had never known a case where a train disregarding the signal went through to the next station. Torpedoes are kept in the office, but witness could not say that the supply had been renewed within two years. The signal is inspected by the signal inspector two or three times a year.

Alexander Johnston Cassatt.

The Board of Directors of the Pennsylvania Railroad, at a special meeting held January 2, upon the announcement of the death of Mr. A. J. Cassatt, the late President, adopted the following minute:

"On the 9th of June, 1899, Mr. Cassatt, after an absence of 17 years from the executive management of the company, assumed the responsible duties connected with its presidency. The events of the years which have elapsed since that date are too indelibly engraved on the minds of the members of the Board to require anything else than the briefest recital. There never has been a period in the history of the American railroads so pregnant with possibilities of evil, but thanks to the genius of Mr. Cassatt and his almost prophetic insight into the future, so fruitful of good not only to the Pennsylvania Railroad, but to all the great transportation interests of the country.

"When Mr. Frank Thomson's untimely death occurred, the forces that had been steadily disrupting the fabric of railroad prosperity had become so controlling that disaster was imminent. The recurrent waves of prosperity and adversity that marked almost every decade in our national life had strewn the path with the wrecks of railroad enterprises and the struggle for competitive traffic had forced down the actual rate paid by shippers to a point where none but the strongest and best equipped lines could earn a living profit. The agreements to maintain rates were not worth the paper on which they were written, and the rebates extorted by large shippers under a threat to divert their traffic, had built up industries whose development often worked injustice to smaller combinations of capital.

"It was at this point that Mr. Cassatt announced the policy of the Pennsylvania Railroad to be the abolition of the rebate system and the extension of equal rates and facilities to all shippers. This meant the observance and enforcement of law, the maintenance of tariff rates, a just recognition of the claims of competitors, and a conscientious and determined effort to secure the adoption of this policy by the other trunk lines.

"The records of the company show what he did. With the cordial support of the board and the shareholders he invested nearly \$90,000,000 in the purchase of securities of the Baltimore & Ohio, Norfolk & Western and Chesapeake & Ohio, and used the influence obtained through these holdings, not for the selfish advantage of the Pennsylvania Railroad, but for the bettering and building up of those lines, with the conviction that in advancing their prosperity he was advancing the prosperity of the Pennsylvania Railroad and making it strong beyond peradventure. It is certain, nowhere else in railroad history can there be found another example of the pursuance of such a broad policy by a powerful company toward its weaker rivals.

"Not only did Mr. Cassatt thus aid far beyond the power of any legal enactment to destroy the evils that had so long existed, but he was one of the first to recognize that the trend of public opinion, and consequently of legislation, was toward the more complete regulation of interstate traffic by the national government. Instead, therefore, of glibly combating such legislation, he endeavored to so shape it (and it was largely through his unwearying effort and influence that it was so shaped), as to secure for the railroad property of the country under the recent enactment, the possession of the judicial tribunal, a right never before denied to the humblest citizen, but one which was almost wrested from the industry which has been the most potential in building up our national prosperity. Mr. Cassatt's part in these two great works has certainly not been overstated. Their influence for good stretches over a continent.

"And while thus broadening and strengthening the foundation of the entire railroad system, his work on the Pennsylvania Railroad has been monumental. Notwithstanding the fact that the policy of the company for a quarter of a century has been to provide in advance for its traffic, and to apply its surplus revenue toward making the crooked path straight, Mr. Cassatt saw that the tremendous impulse which had been certainly given to our national development would require an expenditure far beyond anything that has ever before been dreamed of, and that nothing but heroic measures would put the road in condition to handle the enormous business that would be thrust upon it.

"It is not necessary to recall here the increases of capital stock, the issues of convertible bonds, the bold financiering that to the outsider seemed to border on rashness, but which events have proven were absolutely necessary, and without which the road would seem to-day unable to do justice either to its shippers or its shareholders. Immense terminal yards, relief lines almost gigantic in conception and execution, enormous increases in motive power and equipment, have marked the expenditures during Mr. Cassatt's administration. And now, when a new line from the summit of the Alleghenies has almost reached tidewater, when the waters of the Hudson have been tunneled, when in the near future a great passenger station in New York will be the sign that the South and the Southwest and the Middle West have been united by continuous bands of steel to our

great commercial metropolis; when farther south another magnificent station faces, not unworthily, the National Capitol, when the work of the last seven years has almost reached fruition, the end has come. And with the close of the year all that was mortal of Mr. Cassatt has been laid to rest in the quiet churchyard near his country home.

"To us who knew him so well it is no marvel that he accomplished so much. For 47 years he had been a member of the railroad profession. His technical education as an engineer has been followed by an active experience both in that line and in the operating and motive power departments, until from General Superintendent he had become, respectively, General Manager and Third and First Vice-President, and then, after serving as a Director for 16 years, President. In every position which he filled he had shown a thorough mastery of the problem entrusted to him for solution; a broad and comprehensive understanding of the questions at issue, intuitive perception of the underlying principles involved in their adjustment, and a keen sense of justice toward contending interests. It is no wonder, therefore, that not only his close associates, but all those brought into contact with him recognized in him one of the leading spirits of our age; one of the men who make a nation great, and one whose fame is a precious heritage for his country.

"But great as is his loss to the company with which he was so long connected, the personal loss to each member of the board, to the officers in all departments who have been associated with him, is almost beyond expression. When, on his 67th birthday he spoke of the fact that he was the oldest President of all those who had guided the company through its active life, it was little thought that in less than three weeks his brilliant career would have come to a close. And yet in our pride at his achievements, in our affectionate remembrance of the close friendship so long vouchsafed to us, we can at least endeavor to forget our sorrow in recalling the record that he made in the history of the company in whose service he lived and died."

Cross-Tie Conditions in Some Foreign Countries.

The following from E. O. Faulkner, Manager Tie and Timber Department, Atchison, Topeka & Santa Fe Ry. System, is self-explanatory.

In the early part of this year I sent copies of our tie statistics to all foreign members of the American Railway Engineering and Maintenance of Way Association, with a letter outlining some of the problems now before us in this country in connection with tie matters, and asked for some information concerning similar subjects on the railroad or in the country of which the member was an official and resident. Many of the gentlemen have been kind enough to reply, and the information furnished seems to me so interesting and instructive that I do not believe the writers will object to its being placed before the great body of railroad maintenance men. Some of the life service from ties is especially good, notably in Australia, where eucalyptus wood is used; in every case, however, the difference between the axle load of the foreign engine and car is very great as compared to that of ours; this may account for much of the increased life, but on the other hand they lay many less ties to the mile than we do, theirs being thinner but wider. We are sending to Australia for a number of eucalyptus ties of each variety that will grow in California and produce ties within a reasonable time, and when received will place them under the severest conditions of power and climate we have on the system, so as to learn what we may expect, and how far we would be justified in using them as compared with the present cost and life of domestic ties, while waiting for our own to grow.

E. O. FAULKNER, Manager.

MEXICO.

From J. N. Galbraith, General Manager, Tehuantepec National Railway, Rincon Antonio, Mexico.

"I regret that the records kept of ties and timber by the government and various contractors who had charge of the road previous to the time S. Pearson & Son took hold of it in 1900, are such as to afford very little data of any value on the subject. We did not use any chemically treated ties until the middle of 1904. These were Texas pine, and were treated with 12 lbs. of creosote at one of the creosoting plants on the Texas coast. So far they have given good satisfaction, but the time of their use has been so short as to make any estimate of the merit of the treatment of little value. The other ties used on the road are sawed, untreated Texas pine, and from the best data we have we secure from four to six years service from these, depending on the quality of the timber. We also have quite a large number of mahogany and other native timber grown on the Isthmus, and have fairly reliable data that some of the mahogany ties have been in the track between 12 and 14 years, and the removal of them so far seems to be caused by mechanical action by their being re-spiked several times, and the holes getting so large as not to be able to longer hold the spikes. Other native woods

of some 14 or 15 other varieties, from the best information we can gather, last from two to eight years. We find, however, that we secure the best results in the matter of ties and building lumber, from the California redwood, as there are redwood ties in the track now that have been there for 14 years with a very small percentage of them decayed. We use tie plates on all ties, but these have been put on during the past three or four years. The redwood ties that we have been forced to remove have been principally on account of the rail cutting into them, and decay caused by derailed cars destroying the fiber of the wood and causing rot to set in, but there has been a very small percentage of these. The ones we have taken up on account of being spike-killed after having been in the track on our dry section (similar to southwest Texas) show very little signs of decay on the bottom, and the redwood ties in the wet district promise to last quite as long as those in the dry district, although we have not had sufficient of them in this district long enough to say this definitely. The principal objection we have to the redwood ties is that it is difficult to keep the track in gage on the sharp curves, even with tie plates. On tangents, however, they give no trouble in this respect, and from our experience with them, are unquestionably the best and most economical timber we use.

"The same may be said of the redwood used for buildings and cars, Texas long-leaf pine rotting out in from three to five years, while the redwood siding on our cars and buildings shows no signs of decay after four or five years' use. In the flooring of poorly-ventilated buildings in our wet district here, the Texas pine flooring will rot out in from 18 to 24 months, while the redwood does not seem to be affected in the way of decay by the dampness."

GUATEMALA.

From D. B. Hodgson, General Manager Guatemala Central R. R., Guatemala.

"Our practice here, ever since this road was constructed, or since the year 1880, has been to use a tie cut from California redwood. Under ordinary conditions this was found to be a most satisfactory tie wood, for this section, which is divided into a wet and dry season of equal proportions. The life of this tie was formerly an average of eight years; at that time, however, much better timber was secured for ties than is possible to-day, when the active demand for merchantable redwood leaves available for ties only the tops of the trees and branches. The result is, with heavier traffic and this inferior wood, that the life of the tie is decreased notably, chiefly due to mechanical wear; but few ties, in consequence, reaching a condition of unserviceableness through decay. We use no tie plates. Our locomotives are 4-6-0 type; weight of engine and tender in working order, 65 tons. Maximum freight loads 40,000 lbs., with an average weight of car of 17,000 lbs.

"We have employed in some sections a native hardwood tie, which I would hardly know how to describe in comparison with anything in the United States—in fact, I doubt if there is anything similar to it there. These have given excellent results on curves, where they have been generally employed. As they are obtainable in small quantities only, we have been seeking a substitute for the redwood tie, and I have recently brought out a lot of Oregon pine creosoted ties, and another lot of Oregon pine treated with the 'Carbolineum' process. These have been under track but a short time, and not long enough to determine their relative qualities as compared with the redwood; although in degree of hardness of the wood, and resistance to weight of trains and traffic, I believe them to be superior. I might also add, for your information, that I am now corresponding with parties in Australia relative to a tie cut from a timber called Jarrah (eucalyptus), some of which have been used on the Inter-oceanic road, in Mexico, and are stated to have given excellent results."

ARGENTINE.

From G. Dominico, General Inspector of Railroads, Buenos Ayres, Argentine Republic.

"We use no other timber for ties than the splendid 'iron-wood' which we call 'Quebracho Colorado' (of the Anacardiaceæ order). It is much heavier than water (sp. gr. 1.30 to 1.60) and hard to work. This kind of ties practically lasts forever; there is not a case known where sound quebracho without sap has rotted; on the contrary it gets harder with time. Quebracho Colorado has 30 per cent. more elasticity than oak and pine, three times more resistance against compression, 20 per cent. more against pulling strains and twice as much defective resistance as oak. Some splendid pieces of quebracho ties were sent by me to the St. Louis Exposition, for which I got the gold medal. They consisted of a tie cut in two pieces and some other cross-sections of ties which had then been 25 years in actual service in the track, and were still absolutely sound, bearing the original rail which was worn out, not having been changed in 25 years. We have examples of this and other hard woods in mole and pier work, which after more than 50 years' service show no sign of change in the tide level parts. This is in fresh water; in salt or sea water they would resist the same were it not for the teredo.

"We use three types of ties: 9 ft. x 10 in. x 5 in. for the broad-gage (5 ft. 6 in.); 8½ ft. x 10 in. x 5 in. for the middle (4 ft. 8½ in.) gage, and 6 ft. x 10 in. x 5 in. for the narrow (3 ft. 3 in.) gage; these weigh 100 kgs., 85 kgs. and 70 kgs. respectively (1 kg. = 2.2 lbs.) and make a very solid road, using 12 to 15 ties for a 10-meter (33 ft. 4 in.) rail. In case of derailment the ties are seldom damaged. They are hewn from single trees of 10 in. to 12 in. diameter, or sawn from big ones of 2 to 3 ft. circumference and 50 ft. high, but with preference to the single trees, as the big ones are shipped in-logs to Europe or the United States for tanning purposes. Last year over 400,000 tons of this timber were shipped abroad; this is causing a sharp increase in the price of ties, which last year were in American money, \$1.15 for the large tie, 85 cents for the middle one and 55 cents for the small one, and this year are from 60 to 80 per cent. higher, so that if this increases much more we will have to use some other and inferior timbers.

"The Quebracho Colorado grows on vast plains in temperate (40 deg. to 60 deg. F.) climates, and can be worked almost as easily as oak. These plains reach from Santa Fe and Santiago del Estero provinces to the frontiers of Bolivia and Paraguay, and are covered with enormous and almost virgin forests of all classes of hardwoods. In recent years railroads have been built for the chief purpose of transporting these timbers, as streams and rivers cannot be used because these timbers do not float.

"On account of the hardness of our timber we use no tie plates. Up to recently we have used cut spikes but had to bore holes for them, and once the spike was driven in it was impossible to draw it for any purpose, consequently it had to be broken off and a new hole bored for another. We now use screw spikes so that the old difficulty is overcome. Dowels are not used here as we have no trouble from decay and our timber is very hard. It may be that as quebracho gets scarcer and dearer we will have to use soft wood with hard-wood dowels, but even then we would have good ties as we have several other kinds of timber with nearly twice the compressive strength, and lasting probably twice as long from decay as your oak and pine.

"We use no concrete sleepers, but have some concrete piles in our harbor works. Steel sleepers have been used on some lines with good results (15 to 20 years' service) in locations where there was no salt or saltpeter in the soil; where there is they have not lasted more than six years. Steel sleepers are only used on the sea coast, where they are cheaper than the hardwood ones which have to come by rail."

JAPAN.

From S. Sugiura, Supt. of Maintenance of Way, Nippon Ry., Tokio, Japan.

"The gage of our railroad is 3 ft. 6 in. and the size of cross-ties 7 ft. x 9 in. x 4½ in., different sizes being used for bridge and switch ties. In tangents we lay 13 to the 30-ft. rail and in curves 14 to 16, according to the degree of sharpness. The kind of wood now universally used in Japan is 'kuri,' very similar to your chestnut. The cost depends altogether upon the localities; our company's lines are situated in districts very favorable for tie supplies, consequently we get them cheap, the cost being from 45 to 55 sen each (a sen is nearly one-half the value of your cent). The average life of chestnut is about seven to nine years. No record of cause of removal has been taken, so we are unable to tell the percentage of mechanical wear and natural decay of removed ties. The fastening to the rail is the dog spike, American and English type. In Japan the use of treated ties is not yet general but four years ago our company started creosoting bridge and switch ties, the kind of wood used being Japanese pine, which is not so hard as 'kuri,' and the life service in the track only four or five years without treatment. The life of our treated ties is not yet determined on account of our short experience. The 'kuri' is already becoming scarce and we are using 'hiba' in its stead, the cost being 60 sen; its life is longer than 'kuri,' as it is durable—10 to 12 years in ordinary track—but it is not so hard as the other, consequently its mechanical life is shorter.

"The maximum axle load of our engines is 14 English tons. In the mountain sections where the ruling grade is 1 in 40, we use the 2-8-2, 2-6-2 and 0-6-0 type of engines for freight service, the maximum axle load being 14 English tons. In some sections where coal trains are run we use 2-8-2 type engines, the maximum axle load being 12 English tons. Our freight equipment will average seven English tons with five tons weight of car additional, all being four-wheel wagons."

Year.	No. of ties in line.			No. of tie renewals.		
	Cross.	Bridge.	Switch.	Cross.	Bridge.	Switch.
1902.....	2,140,594	73,044	37,814	270,410	6,397	6,398
1903.....	2,196,006	78,228	37,897	272,961	7,764	4,525
1904.....	2,239,804	80,676	37,932	295,412	8,774	5,704
1905.....	2,264,777	88,236	38,068	326,867	9,064	4,705

From Takuichi Ohmra, Chief Engineer, Hokkaido Coal Mine & Ry. Co., Iwanazawa, Japan.

"The treatment of tie timber in Japan was only recently started so that we have not as yet reached any conclusion in reference to it. The gage of our railway is 3 ft. 6 in., using a rail weighing 60 lbs. per yard, although we have some as high as 70 lbs., and a

little as low as 45 lbs.; it is fastened to the tie by cut spikes, generally of the American type. Our ties are 7 ft. x 9 in. x 5 in., of chestnut, oak, spruce, elm and 'yatitamo,' for which there is no English name, but the wood has a grain something similar to elm. The maximum life of these ties, untreated, is eight years, and the average life five years, the removal being in nearly every case due to natural decay. The maximum axle load of locomotives is 14 tons; freight cars are generally seven tons and ten tons capacity, with tares of three tons and four tons respectively; they are mostly four-wheel cars, but we have a few with bogie trucks. The climate of Japan is something like that of Texas."

RUSSIA.

From Theo. Schidlovski, Chief Engineer, Orenburg Tascho-Kent Ry., Orenburg, Russia.

"The construction of this railroad has only recently been completed, as it has not yet been operated a full year. The ties inserted during construction were untreated pine, but next year we expect to begin using treated ones. So far as I am informed, no reinforced concrete or steel ties have been used on any Russian railroad even for testing purposes, as the timber question is not to us a serious one and our forests are amply able to supply our wants."

INDIA.

From E. W. Stoney, Late Chief Engineer, Madras Ry., Madras, India.

"On the Madras Railway timber ties are used as little as possible, chiefly in station yards for points and crossings and on girder bridges. Until lately teak, untreated, was used for these purposes, and (I speak from memory, not having any papers to refer to now) their life was from 20 to 24 years; but teak has now become so expensive that its use is confined to girder bridge ties. Untreated indigenous timbers have also been used, but their life is very short, five to seven years; now, Australian jarrah (eucalyptus) ties are being largely used in Indian railroads, and these when of good quality have so far proved very satisfactory. The Madras Railway was at first laid with creosoted pine ties sent from England, but their use was given up some 40 years ago. They were replaced by cast-iron pot sleepers of the Graves type connected by wrought-iron tie rods. There is about 900 miles of 5-ft. 6-in. gage road laid with these sleepers, originally six to a 20-ft. 75-lb., double-headed rail, spaced 3 ft. 6 in. and 1 ft. 6 in. at joints. At first 65-lb. iron rails, double-headed, were used, then 75-lb., and now 80-lb. bull-headed steel rails are in use. On the Madras Railway these pot sleepers have been most satisfactory, the renewals being only some three miles per year in a total of 900 miles laid with them. It is essential, however, that good, clean, coarse sand ballast, or small stone, broken to say 1/2-in. gage, be used for padding them. These sleepers do not answer well in soft banks as they sink into the soil for some time, their bearing area (18 in. diameter) being small. On the lines northeast from Madras the timber and steel trough ties are being renewed with Murray's pattern cast-iron sleepers, on which 75-lb. steel rails very much of the American standard section are laid. Various types of steel trough sleepers have been tried in this section, but they are not satisfactory, as if used with saline ballast, or in saline soils, they rust away quickly, and have no scrap value; if ballasted with good clean sand or stone, broken small, these steel sleepers do fairly well. Ferro-concrete sleepers have not, as far as I know, been yet tried in India. The cast-iron pot sleeper makes a very firm, thoroughly-well-tied-to-gage road, and the scrap value of the pots which have to be renewed, nearly always due to being cracked or broken, is high, as they are sent to the locomotive works and re-cast. The heaviest engines on the Madras Railway have only 15 tons an axle, that is 7 1/2 tons a wheel. I am sorry I have not access to papers and statistics now to give you fuller and more definite information, but trust what I have said may be of some slight interest."

NEW ZEALAND.

From James Burnett, Inspecting Engineer, Government Railways, Wellington, New Zealand.

"On the New Zealand Government Railways—about 2,400 miles 3-ft. 6-in. gage, with rails varying from 30 lbs. to 70 lbs. per yard (the latter being the new standard for main lines)—we use from 2,000 (on the old light lines) to 2,500 sleepers (on the main lines and in all new work) per mile, the dimensions being 7 ft. x 8 in. x 5 in. On tangents the rails are fastened entirely by square spikes; on curves, bed plates and fangbolts are used in numbers varying with the sharpness of the curve. Screw spikes are now being experimented with and will possibly to a large extent displace the bed plates and fangbolts. Maximum axle load 11 tons, say 25,000 lbs., but most of our engines are lighter, say nine ton axle loads; types 4-6-2, 2-6-2 and 4-8-0.

"The sleepers used have been mainly New Zealand timbers:

1. Totara (*Podocarpus totara*).
2. Pūriri (*Vitex littorales*).
3. Silver pine (*Dacrydium westlandicum*).
4. Kauri (*Agathis Australis*).
5. Birch (*Fagus fusca*).
6. Rimu (*Dacrydium cupressinum*).
7. Kahikatea (*Podocarpus dacrydioides*).
8. Matai (*Podocarpus spicata*).

Of these the first three are durable and may be counted on to last 15 to 20 years as sleepers. The others have a life of only from five to ten years untreated, and of late years their use has been abandoned, except that Nos. 6 and 7, rimu and kahikatea, are now being creosoted in considerable numbers, 50 to 100,000 per annum, by Boulton's process, with the result that their life is increased to certainly over 20 years. Of a lot of some 200,000 treated 16 years ago 40 per cent. have now been renewed and their calculated life on this basis works out to 24 years.

"Australian hardwoods, all of them eucalyptus, viz., jarrah (*narginata*), ironbark (*paniculata*), etc., gray gum (*propinqua*), and several others have been used to some extent, being strong, tough and extremely durable. Their life is probably anything from 25 to 30 years or even more, and they are used mainly on bridges and sharp curves for which they are suitable. The soft woods among our sleepers fail to some extent by mechanical wear, but the great bulk of renewals are through natural decay. The use of tie plates on the soft creosoted sleepers is being considered.

"Nothing has been done in the direction of experimenting with reinforced concrete or steel sleepers, and owing to their excessive cost we are hardly likely to consider their use for many years."

From James Marchbanks, Engineer, Wellington & Nanawatu Ry., Wellington, N. Z.

"I do not use creosoted or Burnettized sleepers, but over 20 years ago, when in the government service, I put in a good many miles of creosoted red pine or rimu (*dacrydium cupressinum*) and white pine (*podocarpus dacrydicides*). The red pine did not stand well, as it is a close-grained wood, and the creosote did not penetrate deeply. The white pine, which is a soft open-grained wood, stood well and gave an average life of nearly 20 years. This appears to be a somewhat longer life than you are getting. The New Zealand Government Railways are now using creosoted white pine sleepers pretty largely; they are 7 ft. x 8 in. x 5 in., and are creosoted after partially seasoning in stacks. The chief engineer informs me that they stand very well, but are soft and not good on sharp curves. The cost of these creosoted white pine sleepers runs about 4s. each, and as I can purchase first class Australian eucalyptus sleepers at that price, which are in every way more suitable for the purpose, there is no object in our using them. The reason the Government Railways use some of the creosoted soft-wood sleepers is to utilize the local timber and obviate the necessity of sending out of the colony for sleepers, though they use other local timbers, not creosoted, very largely. The principal timber of this class used is totara (*podocarpus totara*). This is a fine clean-grained timber, closer than cedar and resembling pencil cedar. It stands well in wet ground and I have sleepers now in the track with 20 years service, though you may take it that the average life is about 20 years. These sleepers fail principally through mechanical wear; the spikes do not hold and they crack, rot starts at the bottom at ends and gradually destroys them.

"We use now for sleeper renewals the hardwoods from New South Wales, principally ironbark, gray gum and tallow-wood, which are all eucalyptus. The sleepers are hewn 7 ft. x 8 in. x 5 in., and cost us about 4 shillings sterling each. I cannot speak too highly of these N. S. W. hardwoods for use as sleepers and for bridge work. The timber resists decay well, is heavy, strong and holds the spikes without trouble. We use on straight road ordinary 3/4-in. square spikes, and on curves bed plates or sole plates at ends of rail, middles and quarters, with two fangbolts through the bed-plate bearing on flange of rail. Fangbolts hold well, but are expensive, and we are trying just now some screw galvanized spikes, which appear to answer very well. Our rails are light, 65 lbs. to the yard, and 40 ft. long, being now standard. Originally 53-lb. rails were laid and a large number are still in the track after 18 years service. Our loads are light compared with standard American practice, being 22,400 lbs. maximum on 2-8-2 tender engines, and 2-8-4 tanks, and maximum freight wagons are 45,000 lbs. total on two four-wheel trucks."

COMMONWEALTH OF AUSTRALIA, STATE OF VICTORIA.

From Thos. Tait, Chairman Board of Commissioners, Victorian Railways, Melbourne.

"The sleepers in use in this state consist of hardwood which is locally grown and is of the eucalyptus variety, as shown hereunder:

Redgum (*Eucalyptus rostrata*).
Red ironbark (*Eucalyptus leucocylon*).
Gray box (*Eucalyptus hemiphloia*).

There are three different sizes of sleepers used, viz.:

For important lines	..... (5 ft. 3-in. gage)	9 ft. 0 in. x 10 in. x 5 in.
For unimportant lines	..... (5 " 3-in. ")	9 " 0 " x 9 " x 4 1/2 "
For unimportant lines	..... (2 " 6-in. ")	5 " 6 " x 8 " x 4 "

And their average life is about 25 years, but artificial means are never used to preserve the timber. The principal cause for the replacement of sleepers on our lines is natural decay, but, of course, on the lines suburban to Melbourne, and on one or two of our main lines on which the traffic is very heavy, the chief contributing factor is mechanical wear. The fastening between the rail and the sleeper is a cut spike, locally known as a 'dog spike.'

"Regarding the axle load of locomotives, the maximum axle load is as follows:

Passenger	36,960 lbs.
Goods	34,720 "

"Our goods trucks are of 10, 12 and 15 tons carrying capacity, with a few special trucks of greater carrying capacity."

WESTERN AUSTRALIA.

From Thos. Watson, Resident Engineer, Government Railways, Coolgardie.

"We have 1,540 miles of railroad, mostly single road; heaviest engine and tender 81 tons, on eight-coupled wheels, 43 tons. Our ties are not treated in any way nor specially seasoned; they are hauled straight from the bush and put into track; no tie plates are used, nor, in my opinion, are they necessary, so good is our timber. On the whole the rail seats stand wear and tear splendidly,

but both our engines and speeds are easy compared with really busy roads. I have just finished a close inspection of a piece of road built in 1893, rails 45 lbs. per yard, and ties of sawn jarrah (eucalyptus) 7 ft. x 8 in. x 4 in. laid 1,960 per mile. After 13 years' service only 5 per cent. had to be replaced, or 104 ties per mile."

Locomotives for the Italian Government Railways.

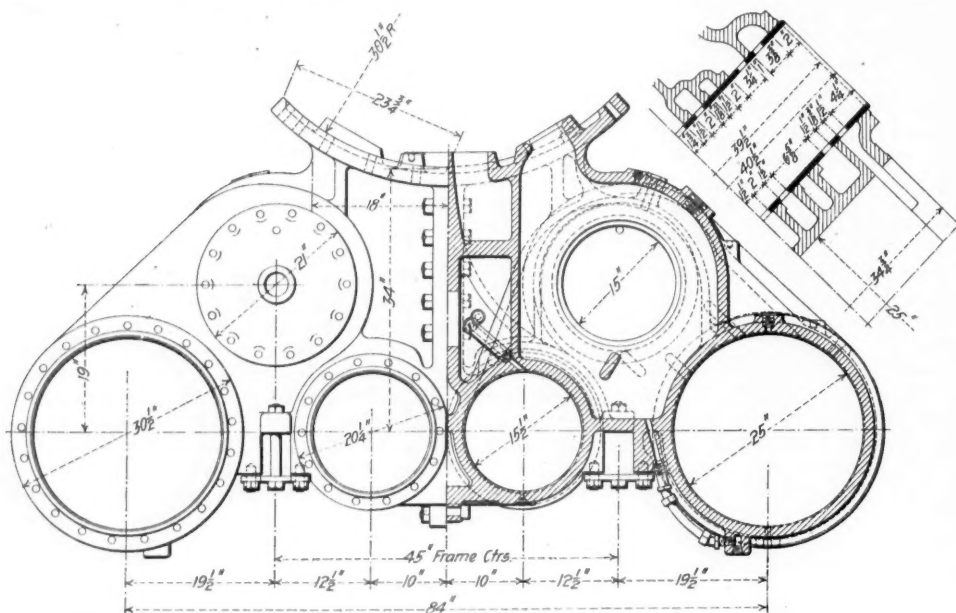
The Baldwin Locomotive Works has recently built 20 locomotives for the Italian Government Railways. Ten of these are simple consolidation engines and the rest are four-cylinder balanced compound 10-wheel locomotives. The general design of these locomotives follows American practice closely. There are minor variations, such as canopy type steel cabs, screw reversing gear, Whitworth screw

threads on all bolts and nuts, screw couplers and spring buffers. To test the efficiency of the two metals, five of the fireboxes of each type of engine are made of copper and five are of steel.

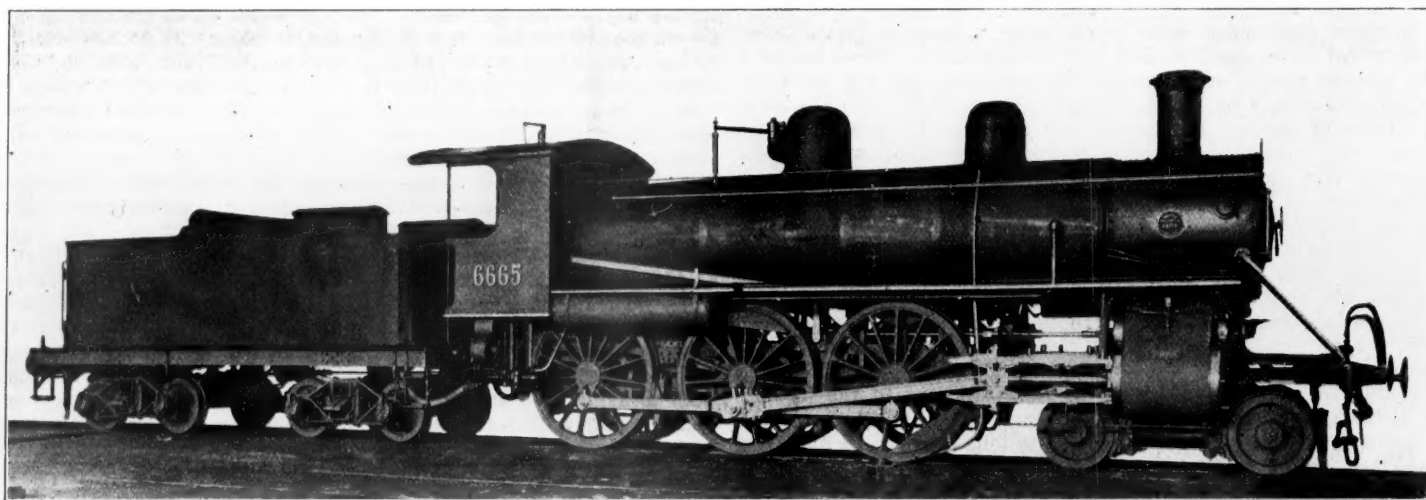
As will be seen from the drawings, the design of the copper firebox boiler does not differ from the usual practice in steel firebox construction except in the thickness of the inner sheets. The working steam pressure is the same in each class of boiler. The comparative thickness of the sheets is as follows:

	Firebox	
	Copper.	Steel.
Side sheets.	$\frac{1}{2}$ in.	$\frac{5}{16}$ in.
Back sheets.	$\frac{1}{2}$ in.	$\frac{5}{16}$ in.
Crown sheets.	$\frac{1}{2}$ in.	$\frac{3}{8}$ in.
Tube sheets.	1 & $\frac{1}{2}$ in.	$\frac{1}{2}$ in.

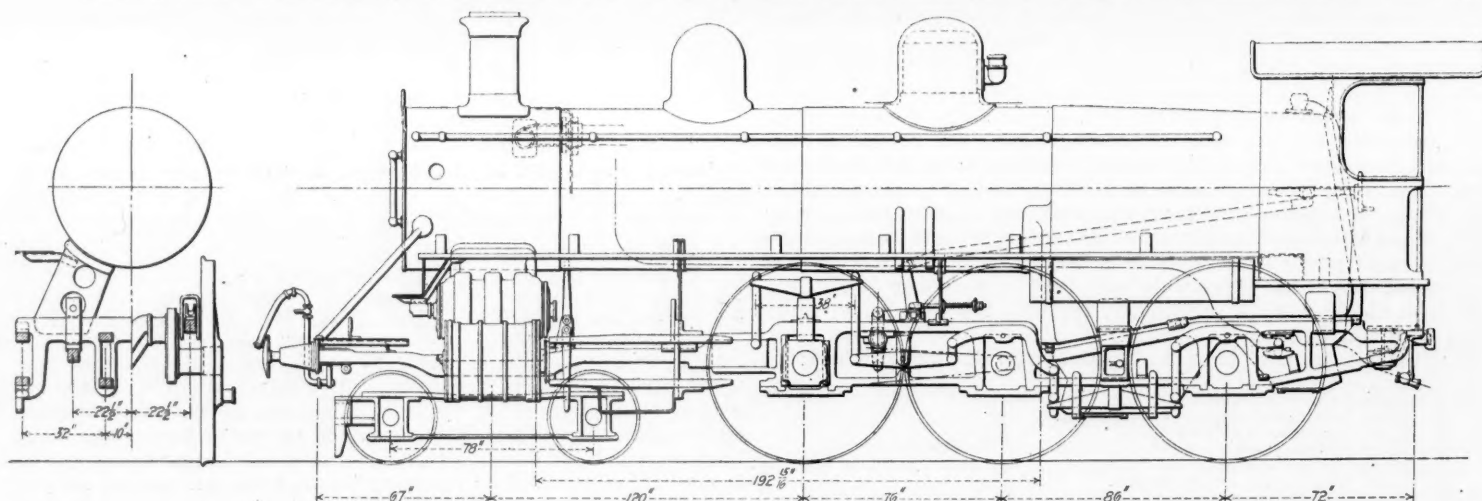
The copper tube sheet is thicker where the tube holes are cut than it is below the throat. The engine truck and tender wheels are of solid rolled steel made by the Standard Steel Works. All of the engines are equipped with the Stephenson link motion. In the compound locomotives, the high-pressure cylinders, which are inside the frames drive the leading pair of wheels and the low pressure cylinders drive the second



Cylinders for Balanced Compound Locomotive; Italian State Railways.



Four-Cylinder Balanced Compound Locomotive Built for the Italian State Railways by the Baldwin Locomotive Works.



Baldwin Four-Cylinder Balanced Compound Ten-Wheel (4-6-0) Locomotive; Italian State Railways.

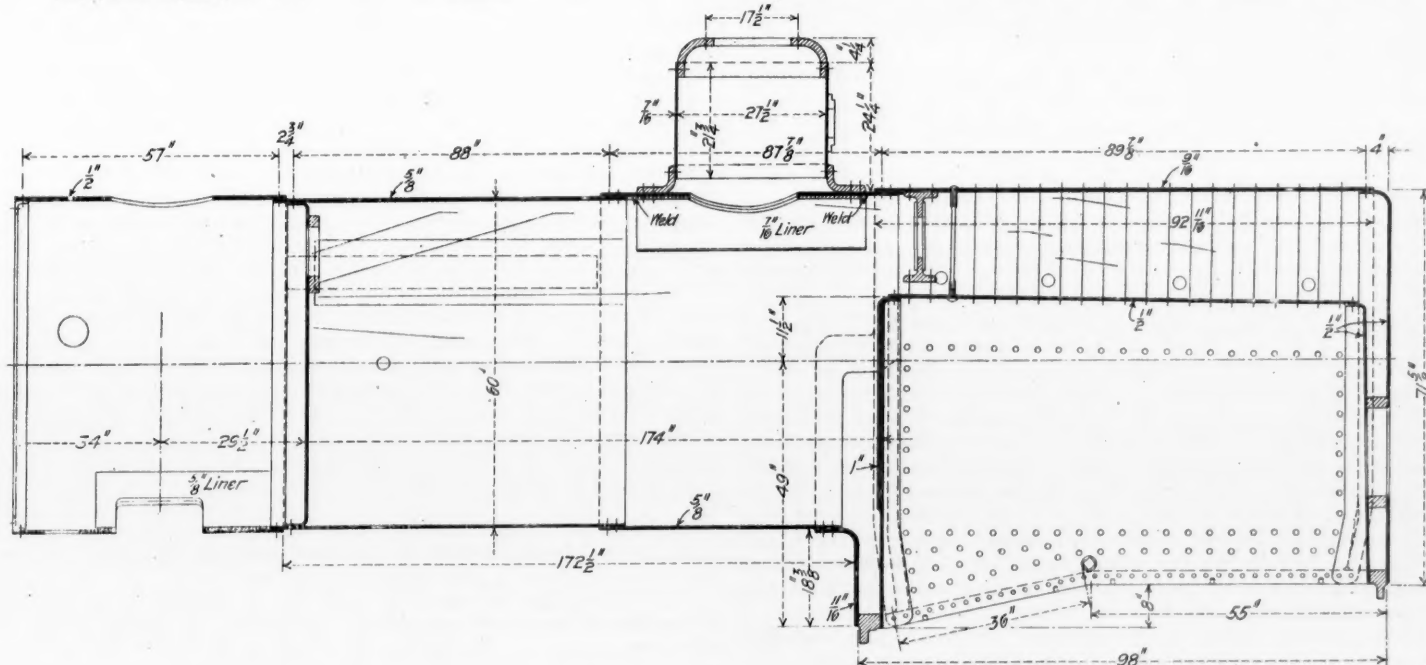
pair. Contrary to the usual practice, the length of stroke of the two cylinders varies; it is 24 in. for the high-pressure and 26 in. for the low. This makes the connecting rods for the high-pressure cylinder comparatively short. The four cylinders are arranged with their centers on the same horizontal line which is in the plane of the top of the single bar forming the front end of the frame. The ratio between the cylinder volumes is 1 to 2.82. When the compound locomotive was first introduced, a ratio of 1 to 2.2 was the accepted practice. Apart from the difference in length of stroke, the cylinders are similar to those used on the balanced compound locomotives previously built by the Baldwin Locomotive Works. One piston valve, 15 in. in diameter, is used for each pair of cylinders. All four guides are braced by one guide yoke. The crank axle is of the Z form and is forged in one piece.

The following are some of the principal dimensions:

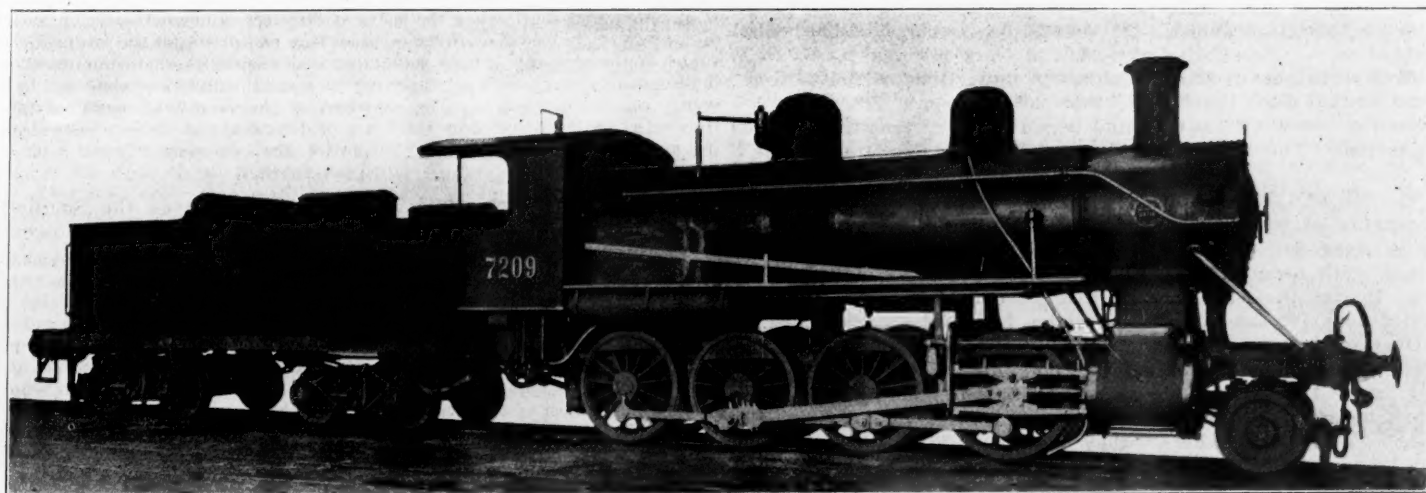
	Consolidation. Simple.	Ten-wheel. Compound.
Cylinders, diameter, H. P.	20 in.	15 1/2 in.
Cylinders, diameter, L. P.	.....	25 in.
Stroke of piston, H. P.	26 in.	24 in.
Stroke of piston, L. P.	.....	26 in.
Valves	Balanced.	Balanced piston.
Boiler, type	Straight top.	.....
" thickness of sheets.	5/8 in.	.....
" w'k'g st'm pressure	200 lbs.	.....
Fuel	Coal or briquettes.	.....
Firebox, material	5 copper, 5 steel.	.....
Heating surface, firebox...	122 sq. ft.	150 sq. ft.
" " tubes	1,962 "	2,018 "
" " total	2,084 "	2,168 "
Grate area	37.5 "	33.25 "
Tubes, No. and diameter...	(260) 2-in.	(250) 2-in.
" length	14 ft. 6 in.	15 ft. 6 in.
Drivers, outside diam.	55 1/2 in.	72.83 in.
Main driving jrnls, diam.	8 1/2 in.	9.0 in.
Main driving jrnls, length.	9 1/2 in.	10.0 in.
Wheel base, drivers	15 ft. 3 in.	13 ft. 6 in.
" total engine	23 ft. 8 in.	26 ft. 9 in.
" eng. & tender	53 ft. 5 in.	55 ft. 6 in.
Weight, on drivers	132,000 lbs.	99,000 lbs.
" on front truck	15,000 lbs.	47,000 lbs.
" total, engine	147,000 lbs.	146,000 lbs.
" engine and tender	263,000 lbs.	262,000 lbs.
Tank capacity	5,280 gals.	.....
Tank, coal capacity	6 tons.	.....

Heating surface	=	55.57	65.29
Grate area	=	.....	.....
Firebox heating surface	=	0.059	0.069
Total heating surface	=	.....	.....
Weight on drivers	=	63.34	45.66
Heating surface	=	.....	.....
Total weight	=	70.53	67.34
Heating surface	=	.....	.....
Volume of 2 H.P. cylinders	=	9.45 cu. ft.	5.24 cu. ft.
Heating surface	=	220.53	41.37
Vol. H. P. cylinders	=	.....	.....
Grate area	=	3.97	6.34
Vol. H. P. cylinders	=	.....	.....
Vol. L. P. cylinders	=	.....	2.82
Vol. H. P. cylinders	=	.....	.....

An account has been given heretofore of the long wire-rope conveyor in northwestern Argentina, from the city of Chilecito, which has a railroad outlet, to the Famatina mines, in the Cordillera. The mines are 22 miles from Chilecito, and about 13,000 ft. higher, which explains why a cable was preferred to a railroad as a grade of 600 ft. per mile is a little too steep. This cable line was built by Adolf Bleichert & Co., of Leipsic, Germany, and was opened for traffic Jan. 1, 1905, having cost about \$384,000 per mile. The cost of transportation (by mules) from the mines to the melting works for ten years previous had been on the average \$12 per ton; by this cable it has been \$1.26 when the shipments are at the rate of 20 tons per hour, and about half as much when they are 40 tons per hour. The ore coming down is so much more in weight than the supplies, etc., going up that it furnishes the motive power, except for a part of the lower end, where the descent is less abrupt.



Boiler with Copper Firebox for Balanced Compound Locomotive; Italian State Railways.



Simple Consolidation Locomotive Built for the Italian State Railways by the Baldwin Locomotive Works.

James McCrea.

After he had been elected president of the Pennsylvania Railroad at last Wednesday's meeting of the directors in Philadelphia, James McCrea held an informal reception for the heads of departments with offices in the Broad street station. One after another the men came in to greet him. All of them, of course, knew about him, had heard stories of his energy and approachability, and all of them felt that a search of the whole country could not have produced a railroader of more experience, more ability, or more genius for organization; but few, if any, of the subordinates were quite prepared for such a complete contrast to the man he had succeeded, Mr. Cassatt.

While Cassatt had been reserved and sparing of his words, McCrea was almost wasteful of his good nature and his cordiality. Where Cassatt had been only studiously urbane and respectfully attentive, McCrea was actively polite and candidly interested.

Mr. McCrea's character was depicted strongly when he said to a friend not long ago:

"From the time I began to have a hand in running the business of a railroad I decided never to buy a newspaper or a politician—and I never have.

"I can forgive an outright thief or a burglar or a safe-breaker," he is quoted as having said, after the recent exposures of some of his railroad associates, "but I hate a grafter, a man who betrays a trust, who leads one life and acts another, who wears a hypocritical smile while he holds out a hand behind him for perquisites. That man is a sneak and a coward, a quitter and a grafter."

Mr. McCrea knows the men. A little while ago he was visiting the office of the president of one of the Pennsylvania's subordinate companies. In the course of the conversation he said:

"By the way, how is young Tommy ——— getting along?"

"Who's he?" responded the subordinate president.

"Why, he's one of the assistant superintendents recently sent down to the ——— division."

"I don't know him."

"Well, I do," said Mr. McCrea. "I know him, and I can tell you that he's a comer, a bright fellow, and one of these days he'll be ready to do big things."

They say that McCrea, whenever any place becomes vacant, always has in mind a good man to fill it. The job may be a despatcher's or an assistant engineer's or something even smaller, but he knows who has had it and whom he wants to have it in future. On the Lines West, over which he has had complete control since 1891, he knows everybody, and everybody knows him.

The new president has worked on every branch of the system between New York and the Mississippi Valley. Born in Philadelphia on May 1, 1848, the son of a physician, he attended the private school of the Rev. John W. Fairies, and then took a course in the Pennsylvania Polytechnic College; but at the age of 17 he was ready to go to work. He became a rodman and assistant engineer on the Connellsville & Southern Pennsylvania Railroad in 1865. After holding that place for two years he went to the Wilmington & Reading, still as a rodman, and on the construction of this road he worked until late in 1868, leaving it to become assistant engineer of construction on the Bennett's branch extension of the Allegheny Valley. It was after three years there that he joined the forces of the Pennsylvania. First, from March 1, 1871, to August 1, 1874, he was assistant engineer in the construction department. It was about this time that he acquired the nickname of "Crosstie Jimmie," which stuck to him for a long time, and still is used occasionally by the men who worked with him in those days.

There was a wreck on his division, where he already had acquired a reputation for energy. Reaching the scene rather late, he rushed to the wrecking foreman and cried, excitedly:

"What can I do? What can I do?"

"Nothing," was the answer.

"Isn't there anything?" exclaimed the young engineer, disappointed.

"Everything has been done except to move some of those crossties out of that ditch over there," said the foreman.

McCrea threw off his coat and began to carry crossties up the embankment. The wrecking crew called him "Crosstie Jimmie" after that.

The fall of 1874 found him serving as assistant engineer in the maintenance of way department on the Philadelphia division, but after a year he was appointed superintendent of the middle division, with headquarters in Harrisburg, where he stayed three years. It was in October, 1878, that he came to New Jersey as superintendent of the New York division for a four-year sojourn.

Over in Jersey City they tell many stories of how "Jimmie" McCrea put life into the local force, reorganized the office, and generally "made things hustle." When he first entered the office, it is related, he saw a group of men, and asked them what were their duties. "We're despatchers," they replied. Going into another room, he saw still other men, and when he asked of them the same question, they said: "We're despatchers." A third group gave the same response.

"Well," exclaimed the new superintendent, "if lightning does not reduce the number of despatchers around this place before I assume my duties, I will." And he did.

From the New York division he was transferred to what is known as the southeast system of the Pennsylvania Lines West. Of these lines he became manager on May 1, 1882, and in that position he remained until October, 1885, when he was made general manager of all the Pennsylvania Lines West of Pittsburg.

About the time he became fourth vice-president of the Lines West, in 1887, although far from an old man himself, Mr. McCrea began to be known in his domain as the patron of young fellows who were seeking to make their way in the railroad world. "Watch the young men!" was his favorite motto.

From fourth vice-president, Mr. McCrea was promoted, in 1890, to second vice-president of the Lines West and in the following year succeeded the late J. N. McCullough as first vice-president. In that position he was almost as much the head of a system as was Mr. Cassatt in the East. Further, he developed into a financier as well as a practical railroader. There was no responsibility with which his chief was afraid to trust him, and so intertwined were their interests in running the many-sided system that it was often hard to tell which was the moving power behind any great improvement in the company. On the day that Mr. Cassatt became president (June 9, 1899) Mr. McCrea was elected a member of the directorate to succeed the former president, Mr. Thomson. Now that he has Mr. Cassatt's place as president of the Pennsylvania Railroad, he will become, as it were automatically, president of half a dozen or more subsidiary concerns.

The change from Pittsburg, where he has been for 25 years, to Philadelphia will be a striking one for the new president. He leaves a splendidly appointed suite in the road's new Pittsburg building and gets in exchange the remarkably plain rooms that Mr. Cassatt liked. But, judging from what one hears about Mr. McCrea and his habits, the plain offices are more appropriate for him. He is a plain man in his manners. Whoever has entered his Pittsburg headquarters will bear witness that he is ready to see all comers, whenever he has the time; that he talks straight from the shoulder, and, although polite, with more of brusqueness than urbanity. He likes no diversion so much as his work.

In his new position Mr. McCrea undoubtedly will adhere to his old methods. The men under him knew he would as soon as they read in the newspapers last Thursday that he had decided to keep the old Cassatt staff in the Philadelphia offices. "Just like him," was their comment. "It wouldn't have been a square deal to make a wholesale shift." That he also intends to maintain his predecessor's general policy is made clear from the statement he issued immediately after his election. The principal change in the conduct of the company's affairs, in fact, seems destined to be the importance of Henry Clay Frick's hand. If there is to be a "power behind the throne," that power will be Mr. Frick. He and Mr. McCrea are old friends. It was Mr. Frick who fought beside him to keep George Gould from obtaining a right of way for the Wabash Railroad into Pittsburg, and they would have won but for the hostility of Frick's enemy, Andrew Carnegie. Yet, nobody who knows Mr. McCrea believes that he will be in any sense under Mr. Frick's thumb. Whatever the "power behind" accomplishes, he will have to accomplish as an ally, not as a boss.—*New York Evening Post.*

Investigation of the Harriman Roads.

The following are extracts from the testimony in New York on January 4 before the Interstate Commerce Commission in its investigation of the Harriman system of railroads.

The by-laws of the Union Pacific provide that:

"The directors shall elect from their number an executive committee of five members. Such committee shall hold office until the next annual election of directors, and shall, when the board of directors is not in session, have all the powers of the board of directors to manage and direct all the business and affairs of the company in such manner as such committee shall deem best for the company's interests in all cases in which specific directions shall not have been given by the board. The chairman of the executive committee [Mr. Harriman] shall be elected by the board of directors, and, subject to the control and approval of the executive committee, shall represent it when it is not in session."

A traffic contract dated June 18, 1903, between the Southern Pacific and the San Pedro, Los Angeles & Salt Lake is as follows:

Article 2.—In partial consideration of the said covenants and agreements of the said Southern Company, contained in Article 1 hereof, said San Pedro Company hereby covenants and agrees with said Southern Company that it will, upon the execution of this agreement, adopt, print, publish, and put in force at all points upon its lease, owned or operated railroad, for the handling of local business thereon, the lawful rates, tariffs, classifications, and charges used by said Southern Company or the handling of any local business which may be the subject of compensation between them.

Article 3.—Each party hereto mutually covenants and agrees to and with the other that after the adoption and putting in force of rates as provided by Article 2 hereof, neither of them shall or will change any such rates without the consent of the other party hereto unless such change may be made necessary in order to meet the rates, charges, classifications, or tariffs of

any other company or competing line of railroad, or to conform to the final decree or judgment of some court of competent jurisdiction, or some lawful and valid requirement of State or National law.

The following are minutes of the Board of Directors of the Union Pacific covering the purchase of the Illinois Central stock:

A meeting of the Board of Directors of the Union Pacific Railroad Company, held July 19, 1906. Director Harriman called Vice-President Cornish to the chair, and then stated to the meeting in substance that he believed it to be to the interest of the Union Pacific Railroad Company to purchase stock of the Illinois Central Railroad Company. That while the Union Pacific line served a large grain-producing territory, it had no line from that territory to the Gulf or to Chicago and into the Southeast; that the export of corn by the Gulf ports is likely to increase steadily; that the value and importance of the system of railroads extending from the Missouri River out and above Omaha and as far north as Minnesota and Wisconsin, and from Chicago and St. Louis on a low grade to New Orleans, as does the Illinois Central, will be enhanced by the construction of the Panama Canal, and the importance and value of such connections to the Union Pacific will be very great; that, while the Illinois Central was generally recognized as an important and valuable system of railroads, yet he believes its strategic value and importance were but little understood and appreciated even by some of those most active in its management, and that, while its stock appeared to be a good investment at prevailing prices, he believes it could be made, and in time was bound to become, very much more valuable.

For these and many other legitimate reasons, which might be stated, he believed the Union Pacific ought to purchase stock of the Illinois Central Railroad Company, now to be had at a fair price. He said, however, that he was interested in the ownership of the stock of the Illinois Central, which he thought the Union Pacific should buy, and because of such interest could not act for the Union Pacific. He said he sought to procure the attendance at this meeting of the largest number of directors possible, so that the question might receive of the board the consideration its importance deserves, and that such action should be taken as the board might think the interests of the Union Pacific Railroad Company require.

After extended discussion of the subject, and upon motion duly made and seconded, the following resolution was unanimously adopted:

Resolved, That Directors Frick, Willcox and Valentine be, and they are hereby, appointed a special committee to inquire into and consider the expediency of purchasing stock of the Illinois Central Railroad Company, with power to contract for the purchase, or for the option to purchase such stock, if they deem such purchase advisable, and report their actions or conclusions to the board.

Directors Harriman, Rogers and Stillman announced that they were interested in the subject matter and upon request were excused from voting.

The records of another meeting of the Board on July 31, four days after the meeting of the Illinois Central's board at which Mr. Harriman and Mr. Peabody abandoned their fight on Mr. Fish, showed that the directors present were Messrs. Ames, Earling, H. C. Frick, Robert W. Goellet, also a director of the Illinois Central; Harriman, Marvin, Hughitt, Lovett, Peabody, William Rockefeller, H. H. Rogers, James Stillman and David Willcox. The special committee appointed at the earlier meeting was ready to report in favor of the purchase. It did so, for these reasons:

Messrs. Kuhn, Loeb & Co. hold or control 150 shares, and Mr. E. H. Harriman, Mr. H. H. Rogers and Mr. James Stillman, members of this board, each hold 30,000 shares of the capital stock of the said Illinois Central Railroad Company, and after negotiations with these gentlemen they have offered to sell to this company the said stock so held by them at \$175 per share as of Aug. 1, namely, ex-dividend.

The committee regarded this price as fair and reasonable. The committee is satisfied that the stock is so closely held that no considerable amount could be purchased upon the market without materially advancing the present market value. We believe the stock is intrinsically worth more than the price at which it is offered. The Illinois Central Railroad Company during the 54½ years of its existence has paid 101 dividends, and is now paying dividends at the rate of 7 per cent. per annum, and is earning considerably more.

Entertaining these views, your committee recommends the acceptance of the offer above mentioned, provided the purchase be within the corporate powers of this company and is otherwise lawful, and to afford counsel an opportunity to examine into and advise respecting the legality of the purchase and for you to determine what shall be done in the light of such service and of this report, your committee has made an agreement with Messrs. Kuhn, Loeb & Co. and Messrs. E. H. Harriman, H. H. Rogers and James Stillman whereby your company is given an option of 15 days to purchase the above-mentioned stock of the Illinois Central Railroad, held by the said Kuhn, Loeb & Co., and Messrs. E. H. Harriman, H. H. Rogers and James Stillman, at the price above-named, with interest at the rate of 4 per cent. per annum from Aug. 1, 1906, to date of payment.

Your committee has been informed by Mr. Harriman that he owns a majority of the stock of the Railroad Securities Company, which owns (as its only other asset other than cash) 95,000 shares of Illinois Central Railroad Company stock, subject to the pledge of 80,000 shares to secure \$8,000,000 par value of 4 per cent. certificates, redeemable at 105 and interest. Mr. Harriman has further stated to the committee that in case the company purchases the Illinois Central Railroad Company stock offered by Messrs. Kuhn, Loeb & Co., Mr. Harriman and the other gentlemen above-named he thought that the company should have an opportunity to purchase his stock in the Railroad Securities Company at a price based upon the price at which Illinois Central Railroad Company stock had been offered to the company by Messrs. Kuhn, Loeb & Co., Mr. Harriman and the other gentlemen, above-named, and we have taken from him an option to that effect for 15 days.

All of which is respectfully submitted.

H. C. FRICK,
DAVID WILLCOX,
P. A. VALENTINE.

Later Mr. Harriman bought all the shares of the Railroad Securi-

ties Company, paying Mr. Fish for his interest \$1,536,449.81 in the stock of the Illinois Central and \$1,537,020.49 in cash.

In regard to Mr. Harriman's powers, a resolution adopted July 26, as amendment to a similar resolution which had been in force since 1902, provides:

That E. H. Harriman, Chairman of the Executive Committee, be, and is hereby, authorized to borrow such sums of money as may be required for the uses of this company; to execute in the name and on behalf of this company a note or notes for the amount so borrowed; and to pledge the securities of this company as collateral to such notes. In the absence of the Chairman of the Executive Committee, authority is hereby given to the Treasurer of the company, and to W. D. Cornish, one of the Vice-Presidents of the company, or to the Treasurer and Controller of the company, to sign jointly, on behalf of this company, notes for the amounts so borrowed and to pledge such securities as collateral thereon.

A letter from Mr. Harriman to Mr. Gould, in regard to the building of the Western Pacific, follows:

George J. Gould, Esq., 195 Broadway, New York City.

Dear Mr. Gould: I am in receipt of yours of the 25th inst., as follows:

"You doubtless know that I have determined to support the Western Pacific construction. This I regard as necessary for the protection of the system in which my interests are greatest. If you think this involves reasons why we should reciprocally withdraw from the boards of which we are the respective heads, I would be glad to meet your view. I prefer that you should reach your own conclusion as to whether, remaining as we are or withdrawing as above suggested, would be better for the interests we represent."

It seems to me that you settled the question of your own withdrawal from the Union Pacific and Southern Pacific boards on March 8 last, when, after the Western Union Board meeting, you, Mr. Schiff and myself had a talk regarding your connection with the Western Pacific. You then stated that you had no interest whatever in the construction of the line, and were not committed in any way thereto, but that you did not mean to convey the impression that you might not in the future, but, if you did, you said you did not think it would be right for you to be in the counsels of our allied lines, and also you would give us due notice of intention on your part to promote the construction of the Western Pacific. On March 9 the Union Pacific Executive Committee was elected and you were included therein. I am not conscious of any act on my part which might be considered as detrimental to any of the properties of which I am or have been a director. I have not taken part in any proceedings of the Denver & Rio Grande for a long time, and had presumed that I had not been re-elected to that board. I also declined to qualify as director after my election to the Rio Grande Western, as I did not want to be in any way responsible for the attitude to be assumed by that company toward the Western Pacific.

The era of prosperity through which we are now passing has been marked by less construction or of destructive, competitive and non-producing lines of transportation than any former one, but there has been great expenditure in providing for improvements and additional facilities to the already existing lines, thereby better conserving the interests of the public and the shareholders as well. For myself, I shall regard the loss of your advice, which I have valued in our affairs, as well as the personal pleasure of having you included in them. If there has been any misunderstanding of my directorship in the Denver & Rio Grande and the Rio Grande Western, will you please advise the boards of those companies of my withdrawal from or declination to qualify as one of their body?

Believe me,

Yours truly,

(Signed) E. H. HARRIMAN.

In the hearing on January 5 it was brought out that at a meeting of the Executive Committee of the Oregon Short Line of March 31, 1903, the chairman, Mr. Harriman, had stated that, "pursuant to his authority," he had sold 300,000 shares of Southern Pacific at 57½, \$6,000,000 to be paid in cash and \$11,350,000 to be paid "at the option of the purchaser" before May 1, 1904, collateral to be deposited whose market value should be always in excess of the deferred payments. At a meeting held in November the chairman had informed the committee that pursuant to a letter from William Rockefeller he had closed the transaction with Mr. Rockefeller and had paid the amount involved, and the committee had then resolved "that the action of the chairman in the transaction with Mr. William Rockefeller in connection with the Southern Pacific stock be and hereby is in all things approved." A letter from William Rockefeller to Mr. Harriman as chairman of the Oregon Short Line, dated at 26 Broadway, November 5, 1903, was as follows:

Referring to the agreement entered into between you and me on March 30, 1903, in respect to the 300,000 shares of the capital stock of the Southern Pacific Company, I beg to state that I should be glad to have you take over the stock now instead of waiting until the 1st of May, 1904, as originally contemplated. If you are prepared to do this I am willing to reduce the commission agreed upon to five-eighths of 1 per cent., viz., \$187,500, and shall be ready to close the matter upon receipt of your check for the principal amount involved, with interest at 6 per cent., together with the amount of said commission.

Yours very truly,

WILLIAM ROCKEFELLER.

It was shown that on December 13, 1906, Mr. Harriman had reported that he had organized the Pacific Fruit Express Co. under the law of Utah, the Southern Pacific and the Union Pacific each to take one-half of the stock, the company to be capitalized at \$12,000,000. He also reported that he had bought for that company 6,000 refrigerator cars for \$10,400,000; also that he had organized an equipment company to buy and lease to the several companies all equipment needed by them.

W. D. Cornish, vice-president of the Harriman lines, testified about the acquirement by Mr. Harriman of the Los Angeles street railway system, or rather 45 per cent. of its stock, the remainder

being in friendly hands. The minutes showed that Mr. Harriman reported that this had been done "to prevent it from falling into other hands." Another purchase was that of the Utah Light & Power Company, Mr. Harriman having reported at a meeting of the Southern Pacific executive committee that he had bought three-fifths of the capital stock. The purchase, Mr. Cornish said, was regarded as advantageous to the Southern Pacific, as it would build up the town.

On January 8, at Chicago, it was developed on testimony of President Ripley, of the Atchison, Topeka & Santa Fe, that two years ago Mr. Harriman, on behalf of himself and several other men, informed him that they had \$30,000,000 of Atchison stock and demanded representation on the board. This was given to them, as they could have forced it anyway. The directors elected at Mr. Harriman's request are H. H. Rogers and Henry C. Frick. Both are directors of the Union Pacific, though Mr. Ripley was quite positive in declaring that so far they had to all appearances served the Atchison loyally. He testified, also, that his first knowledge that the Union Pacific as a company held Santa Fe stock was from the press despatches from New York last week.

A Cast Steel Bumping Post.

The trunk or body of the bumping post shown in the accompanying drawings is a hollow steel casting of curved form, carrying on its upper or buffing end an oak buffing block; its lower end rests on a nest of four standard M. C. B. 6-in. x 8-in. draft springs. These springs bear on a suitable spring seat bolted to longitudinal timbers secured to the ties. The arms, or tension member, are a single casting of triangular form spanning the track, with a projection at the apex which extends through a rectangular opening in the body casting and is secured to it by a transverse key. At the lower end each arm has a flanged trunnion which bears on and engages a suitable recess in a bracket bolted to the rail. This bracket is secured by bolts passing through the web of the rail, but the bracket grips the rail base and the bolts are therefore not in shear. To prevent the trunnions from being forced out of the recesses in the brackets by a buffing shock, the opening through which the trunnion must slip to enter the recess is made smaller than the diameter of the trunnion, which is flattened at one point sufficiently to allow the trunnion to slip in when the arm is at right angles to its normal position. The bracket is given a section at point of maximum stress equivalent in strength to an 80-lb. rail section.

Since the bracket, to fit the rail, must conform to the contour of one side of the rail, each weight of rail requires a special bracket. An adjustable bracket has been designed that can be applied to any size of rail between 60 and 95 lbs., a detail of which is shown. The outlines of the two extreme sizes of rails to which it is applicable are indicated, showing its relation to each. For sections under 95 lbs. a shim is placed on top of the base to clamp the bracket tightly against the under side. The holes are made oblong vertically to allow for this. The spacing of the bracket holes is the same as for the standard angle bar and in temporary applications the brackets can be applied by substituting them for the bars. In permanent applications, however, the bracket should abut against the angle bar, requiring special holes to be drilled through the rail web.

The estimated weight of the post is: Body, 450 lbs.; arms, 460 lbs.; brackets, 125 lbs. each; spring seat, 250 lbs.—a total of 1,410 lbs. The spring seat may be made of cast steel, malleable iron or cast iron. This post costs more than a wooden post. Its chief claim to merit lies in its cushioning. It saves damage to the cars and their contents. The application of a friction draft gear in place of the springs to absorb the recoil unavoidable with the latter has been considered. This would make some further increase in the cost. In the event of the complete destruction of this post it has a scrap value.

The parts are so proportioned that the springs of the post and of the car draft gear are fully compressed before the car wheels touch the rail bracket. A metal protecting plate, not shown in the drawings, is provided on the front of the oak buffer block. The post was designed by Mr. W. E. Symons, President of the Pioneer Cast Steel Truck Company, Chicago.

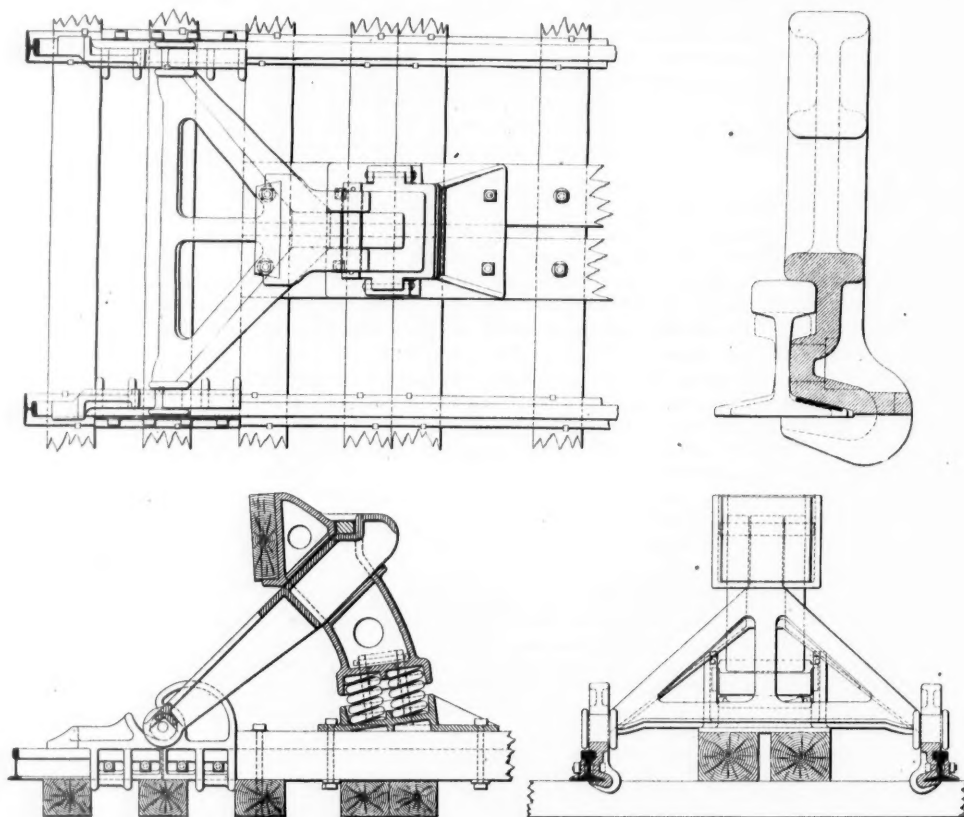
The Great Corporations.*

One prevalent cry against the corporations is that they drive out the man who has built up a business for himself and wants to leave it to his son. To the millions of us whose fathers did not build up and leave to us a business the great corporations offer and will continue in widening range to offer a field in which advancement does not depend upon wealth. The ranks of the railroads afford opportunity for the lad of parents rich or poor, who undergoes discipline that obliges him to be punctual and obedient, temperate and courageous. The promotion of the son of his father is in evidence, but not by any means the rule; and the promotion of the unworthy son a rare exception. The shares and securities of the established railroad companies have reached a stability that makes them for investment second in desirability only to the obligations of the staple political governments.

Could this condition which the railroads have attained and maintain, notwithstanding the merciless drubbing which they have received and are receiving, could this condition be attained and maintained by the other industrial organizations would not the material status of this country be vastly improved?

That the discussion of the problems of property which has been incessant during these several years is leading to this end there is abundant evidence. As the people as a whole better understand what the corporate regime means, there will be the less dishonesty on the part of corporation officers; and well balanced action that often through popular ignorance is condemned as dishonest will be appreciated as it deserves.

For the citizen in the ordinary walks of life to invest in the ownership of the industrial and commercial corporations that have



Symons Cast Steel Bumping Post.

been so rapidly multiplying has often been but to venture on the quicksands. This is because he has not known, and in many cases has had no means of knowing, what he has been buying. Here again the older corporations, those of the railroads, afford an example. The bases for railroad accounting are quite generally recognized and established. From the balance sheet, the income account, the statistical tables in the report of nearly every railroad company may be gained fairly exact information as to the status of that company, as to its assets, its liabilities, its earnings, its efficiency. But a very few of the great industrial corporations issue reports similarly explicit and satisfying.

If one were to designate what would constitute the first step toward gaining a general and a popular acceptance of the corporate regime it would doubtless be this, that each corporation should periodically publish a statement that would give to its stockholders and the public in general as complete and explicit information in regard to its status and its performance as may be obtained respectively from the annual reports of the Pennsylvania Railroad Company and the United States Steel Corporation.

*From "The Evolution of Property," a paper by Logan G. McPherson, presented at the annual meeting of the American Association for the Advancement of Science, Dec. 27, 1906.

GENERAL NEWS SECTION

NOTES.

It is given out that the Chicago & North-Western has made 1,625 surprise tests during the past year and has not caught a single engineman in trying to disobey the rules.

The New York State Court of Appeals has decided that the Brooklyn Rapid Transit has the right to charge ten cents as the fare to Coney Island, thus disposing of the issue under dispute in the riots of last summer.

The increase of enginemen's pay on the New York, New Haven & Hartford, announced a few weeks ago, amounting to about 35 or 40 cents per 100 miles, is now followed by a similar announcement of increase on the Boston & Albany and the Boston & Maine; but, according to the reports, the increase is considerably less on the Boston & Albany, and amounts to only 25 cents per 100 miles on the Boston & Maine.

A press despatch from Topeka states that the traffic managers of the principal roads in Kansas have agreed to make general reductions in freight rates, and that, consequently, suits which have been begun by the state officials in the Federal Court to enforce a reduction will be withdrawn. It is said that the reduction in rates on coal will be one mill per ton per mile, and on grain 7 per cent. There will be a reduction of 10 per cent. on paper west bound. Altogether it is calculated that the citizens of Kansas will save from \$1,000,000 to \$1,500,000 annually by this reduction.

Representative Morrell, of Pennsylvania, has introduced in Congress a resolution to have a special inquiry made by Congress into the safety of railroad operations. The resolution requires the committee to recommend legislation to empower the Interstate Commerce Commission to regulate interstate train movements with a view to prevention of collisions. The resolution evidently covers the same ground as that already covered by the Mann resolution of last June and therefore is superfluous. The Congressional Committee would be doing the same work which the Commission has already begun.

Working along another line, the Interstate Commerce Commission has recommended that automatic stops be tested. This recommendation is noticed in the editorial column.

A press despatch from Houston, January 7, says that the strike of the Southern Pacific firemen has been declared off. An agreement has been signed, providing:

1. A board of arbitrators shall determine whether the Southern Pacific company abrogated its contract with the firemen when it signed the new agreement on May 1, 1906, with the engineers. The company shall name one of the board, the firemen shall name a second, and the two thus chosen shall select a third.

2. All employees who went on strike shall return to their former positions without prejudice to their rights.

3. The seniority of engineers who went on strike shall be determined at a meeting of the general board of adjustment of the Brotherhood of Locomotive Engineers of the Southern Pacific Company, Atlantic system, at a meeting to be held in Houston on January 10.

4. What each organization shall concede will be determined by the board of arbitration.

Nearly all the men on strike have either returned to work or will return at once.

Changes of White Star Line Ports.

Next spring the faster steamers of the White Star Line will not land at Liverpool, Eng., as heretofore, but at Channel ports. The eastbound steamers will land mails at Plymouth, and then go on to Cherbourg and Southampton to land passengers. Westbound, the boats will start from Southampton, call at Cherbourg, and then at Queenstown. This service will begin with the first eastbound voyage of the new steamship "Adriatic," which sails from Liverpool on May 8, and from New York on May 22. The "Oceanic," "Teutonic" and "Majestic" will also carry on the new service, the other boats of the White Star fleet continuing to sail from Liverpool.

Two Cents a Mile in Canada.

A bill has been introduced into the lower house of the Canadian Parliament making two cents a mile the highest legal passenger rate which can be charged on Canadian railroads. This bill is being strongly opposed by the Canadian roads, first on the ground that their passenger receipts per mile operated are much lower than in the United States, particularly than in those parts where a two-cent rate is in force, and second that the enforcement of a two-cent rate would inconvenience a large part of the public, since all low

excursion rates would be cut off. Excursion rates in Canada are more frequent and lower than south of the boundary, averaging one and one-half cents a mile. On the government railroads, the Intercolonial and the Prince Edward Island, second-class return tickets are sold at single first-class one-way rates (three cents a mile). The Intercolonial also has Saturday excursions when first-class round trip tickets good going Saturday and returning Monday are sold at the one-way fare.

One Day With a Railroad Magnate.

7.30 a.m.—Reads morning newspapers and learns that he is to be investigated by the Interstate Commerce Commission; that he is likely to be indicted by a grand jury in Kansas; that he is to be investigated by the Missouri Legislature; that he is robbing the farmer, plundering the merchant, and crippling the commerce of a continent.

7.45 a.m.—Receives telegram from leading chamber of commerce stating that business of the nation is being ruined by the combinations he has formed, and asking him to resign from all his presidencies and directorships and retire to oblivion.

8 a.m.—Receives word that business in the states through which his railroads run is so great that existing transportation facilities are utterly inadequate, and asking if he would have any objection to the paralleling of his tracks with canals.

8.30 a.m.—Receives a message to the effect that the shortage of cars on his main lines and branches is killing one branch of trade, while it is booming another. Asked what he is going to do about it.

9 a.m.—Notified that he has been indicted by an Ohio grand jury for exceeding the speed limit in his efforts to relieve the car congestion.

9.30 a.m.—Hears that the President is going to devote a special message to him.

9.45 a.m.—Is informed that shippers along all of his lines are going to bring suits against him for the reason that his employees do not work hours enough daily to clear the side tracks of loaded cars.

10 a.m.—Receives word that 79,865 employees of his consolidated system are about to strike for shorter hours.

10.15 a.m.—Is notified to appear at once before the transportation committee of the Oskaloosa city council, or his right of way through the town will be declared forfeited.

10.30 a.m.—Called to the telephone to receive long distance message from state's attorney of Clark County, Montana, informing him that he is about to be tried for violating 19 different sections of the railroad law of the state.

11.30 a.m.—Hears that he has been indicted for manslaughter in consequence of accident in Iowa.

Noon.—Is cited to appear before the Interstate Commerce Commission to answer questions which it is hoped may send him up for life.

12.30 p.m.—Learns while lunching that all brakemen on all of his lines refuse to brake until he raises their wages 25 per cent.

1 p.m.—Is condemned by National Passenger Association for crowding his rails with merchandise trains, and threatened with 7,000 suits for damages.

2 p.m.—Receives notice from the Secretary of the Western Association of Shippers that unless he suspends the running of passenger trains for a week or ten days, so as to allow the freight to be handled, he will be lynched if caught west of the Mississippi.

3 p.m.—Is informed by a delegation from Batavia, Wis., headed by the Mayor, that unless his lines cease to grant preferential rates to the rival town of Hamburg the matter will be brought to the attention of Congress at the earliest possible moment.

4 p.m.—Is notified that he has been indicted by the grand jury of Douglas County, Nebraska, on 37 distinct counts.

5 p.m.—Closes his desk and goes home, where he cannot pick up a magazine that does not contain a character sketch of him as America's most dangerous and possibly wickedest man.

7 p.m.—Retires for the night, as the only safe way of avoiding hearing comments made by members of his household upon the remarks made about him in the evening papers.—*Chicago Inter-Ocean.*

Lumber Production in United States in 1905.

According to a recent bulletin issued by the Forest Service, Department of Agriculture, 11,666 mills in the United States cut 30,502,961,000 ft. b.m. of lumber of all kinds during 1905. Yellow pine was cut in the largest amounts, 28.8 per cent. of the total production, with white pine, Douglas fir, hemlock and white oak next in order. The soft woods contributed 81.3 per cent. of the total. In the production by states Washington leads with 12.8 per cent. of the total cut, followed by Wisconsin, 8.3 per cent.; Louisiana, 7.5

per cent.; Minnesota, 6.3 per cent., and Michigan, 5.6 per cent. Thirty-three states cut over 100,000,000 ft. each, and the remaining states and territories together produced only 292,060,000 ft. The cut of white oak, in which West Virginia leads with 12.9 per cent., was 1,210,216,000 ft., which is a decrease of 43 per cent. in the cut reported by the Census in 1899.

Two Telephone Companies in New York City.

As the result of an investigation of the telephone service in 39 cities where two telephone companies are operating H. P. Nichols, engineer for the Bureau of Franchises of New York City, concludes in a recent report that double service in New York would be both inconvenient and costly should a franchise be granted to the new Atlantic Telephone Co. He finds that independent telephone companies are operating in all the principal cities in the central part of New York state, and in many smaller cities and towns in the vicinity and they claim to have in operation nearly 92,000 telephones. Competition exists in almost every place of any size or importance throughout Pennsylvania, and the independent movement has secured a firm foothold. In some places the service of the independent companies is inefficient and unequal to that of the Bell companies. The cause of this inefficiency seems to be due to lack of management or discipline, and the want of capital more than any other reason.

Generally speaking, there are no independent commercial long distance connections throughout the state, but connections are advertised which it was found could not be made. As a whole, the independent companies are not so strong as in many other localities visited, though the number of telephones is increasing very rapidly, in spite of the efforts on the part of the Bell companies to prevent their growth.

As to the Atlantic Telephone Company, Mr. Nichols believes the company has made its application for a franchise without properly figuring out the rates, and he points out that in the proposals there is nothing to show what the rates will be for private branch exchanges and extension stations, which, he believes, should be specified in the contract. In cities where there are two telephone companies there are cheap rates and good service, but inconvenience has resulted and additional expense to subscribers who, to get full service, must subscribe for both telephones.

Suit Against Gould Roads.

Suits to dissolve the alleged merger of the Wabash, the Missouri Pacific and the St. Louis, Iron Mountain & Southern Railway Companies and the Pacific Express Company, and to revoke the licenses and charters of the Pacific Express Company, American Refrigerator Transit Company, Western Coal & Mining Company, Rich Hill Coal Mining Company, and Kansas-Missouri Elevator Company were filed in the Supreme Court of Missouri by Attorney-General Hadley on Wednesday. The petition alleges that the stocks of the companies named are owned by the same interests, the Goulds, in violation of the provisions of the Constitution and laws of Missouri.

Concerning the suit, Attorney-General Hadley said:

"These suits are brought for the purpose of forcing a discontinuance of the ownership of the stock of the Wabash, Missouri Pacific, and Iron Mountain companies, and the control of these three companies, two of which are paralleling and competing lines, by the same interests, and to force a discontinuance of the ownership of the stock by these companies in the Pacific Express Company, American Refrigerator Transit Company, Rich Hill Coal Mining Company, Western Coal & Mining Company, and the Kansas-Missouri Elevator Company. By this stock ownership these roads have, in fact, been engaging in business not authorized by their charters and prohibited by the constitution and laws of the state."

Short Free Time in France.

It is not in this country alone that freight cars are scarce. On November 5, 1906, the French Minister of Public Works addressed a communication to the railroad managers of that country urging them to take action for the purpose of supplying sufficient equipment for the demands of traffic. In reply the managers have requested to be permitted to shorten the period allowed consignees for unloading the cars. Under the present law a consignee is obliged to unload the shipment during the day when he has received notice of its arrival by 6 o'clock of the evening before. If he does not unload the car during this first day he is charged \$2 a day demurrage for the next three days, and \$2.40 a day thereafter. The managers desire to change the time of notice to 9 o'clock in the morning with the obligation to unload during the same day, and suggest on the other hand that the demurrage charge between January 1 and August 31, which is a period of slack traffic, should be lowered to one dollar per day per car.

In the correspondence it is claimed by the Minister that the delay in unloading does not generally exceed 24 hours, and he urges

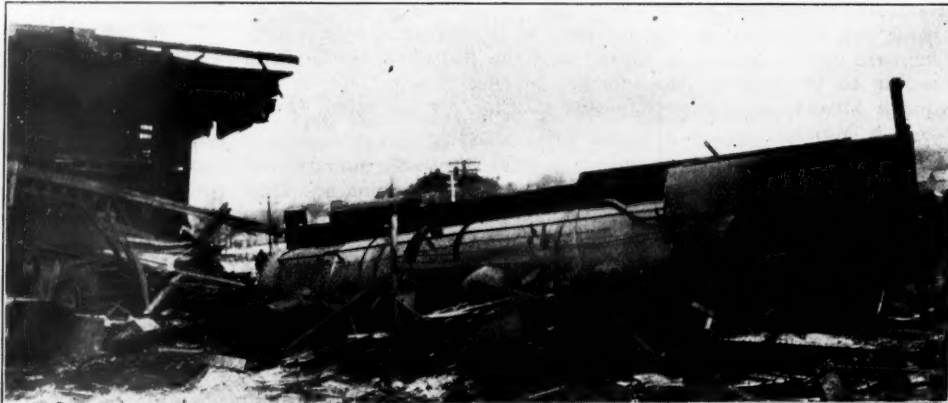
a greater daily average movement of cars on the part of the railroad companies. It appears also that formal proceedings would be necessary to change the regulations, which are prescribed by law.—*Official Guide.*

Holding Company for Morse Steamship Lines.

The Consolidated Steamship Lines Company, with an authorized capital of \$60,000,000, was organized at Portland, Me., on January 1, 1907, to conduct general steamship business. This is to be a holding company for steamship lines owned by Charles W. Morse.

A Road Crossing Accident.

What happens when a fast passenger train hits a log wagon stalled on a road crossing is shown in the accompanying illustration. The engine left the rails, plowed along the roadbed for about 400 ft., crashed through a flour mill alongside and finally turned



Fallen by the Wayside.

over on its side and stopped. The train followed the engine but none of the cars were overturned. The fireman was killed and two of the trainmen died of their injuries, but none of the passengers were hurt. The railroad company is rebuilding the flour mill.

Reduction in New South Wales Railroad Rates.

Late in December it was announced by the Premier of New South Wales that, owing to the general prosperity and the favorable conditions of the railroad finances, reductions would be made in freight rates and passenger fares amounting to about \$1,500,000. The New South Wales railroads are owned and operated by the colonial government.

The Golden Locomotive Steam Gage.



Golden Locomotive Steam Gage.

The distinguishing feature of the Golden locomotive steam gage, the mechanism of which is shown in the accompanying illustration, is the construction of the expanding tubes. A flattened seamless brass tube is encased within a seamless steel tube and the two are drawn and treated by a secret process. It is claimed that the tubes so made are non-corrodible and will never take a permanent set, thus destroying the accuracy of the gage. The tubes are tested to 1,000 lbs. pressure before being put in the gages, which are made for pressures up to 400 lbs. They can be fitted to any other form of clock mechanism besides the one shown, which, however, is both simple and efficient. These gages are made by the Golden-Anderson Valve Specialty Co., Pittsburg, Pa.

Report on Dakota Car Shortage.

The Interstate Commerce Commission has made a preliminary report on its investigation of the car shortage in the Northwest, but has given no conclusion. There is little that is new in the report. With regard to the coal famine in North Dakota Commissioners Lane and Harlan (who made the investigation) found "indisputable proof" that there was "an agreement between the coal dealers to maintain prices and to boycott all who do not so agree," but they did not find that this combination is "chargeable with the coal shortage prevailing," or that the railroads were party in any way to such a con-

piracy. They attribute the coal scarcity to "such an abundance of westbound traffic at the head of the lakes that cars were not available in the congested state of that terminal for the carrying of coal to North Dakota, a comparatively short haul for a low-class commodity." The report indicates that the scarcity, when the cold weather came on, might easily have been avoided by proper foresight and co-operation between the coal dealers and the railroads.

The eastbound grain situation was quite as bad. The country elevators were crammed and grain had to lie on the ground or in exposed bins, while terminal elevators at Duluth, Superior and Minneapolis were waiting for it, empty or partly filled, because the railroads were unable to carry it for lack of cars.

Financial loss to many people is shown to have been caused by the failure of the railroads to prepare for a large movement of grain. The report says:

"Fifty million bushels of grain, as nearly as can be estimated, remain on the farms or in the country elevators of North Dakota. But 38 per cent. of the crop has been shipped." Of the reciprocal demurrage the report says:

"The enactment of a reciprocal demurrage bill will not build railroad track, equipment, enlarge and simplify terminals, nor transform incompetent operating officials into first-class railroad men, but it might stimulate, energize, and in some cases revolutionize the methods of delinquent railroads, so that they would render the service which they were created to render. This is the theory of reciprocal demurrage. But that this of itself will enable the railroad to render adequate service is not demonstrated by experience."

Mahogany Ties in Mexico.

J. M. Neeland, Vice-President of the Pan-American Railroad, now open from a connection with the Tehuantepec National near San Geronimo, Mex., to Pijijapam, 161 miles, is reported as saying that hardwood is used almost altogether for ties, and that fully 12 per cent. of the ties thus far laid are mahogany. The *chico zapote*, from which chicle gum is extracted, is also used. The intense hardness of this tree, which increases with time after it is cut down, makes it particularly valuable as a railroad tie.

First Contested Case Under Revised Law.

The Interstate Commerce Commission, in an opinion by Commissioner Clements, has announced its decision in the case of the Frederick Brick Works against the Northern Central Railway Company and the Pennsylvania Railroad Company. The decision is in favor of the complainant. This is the first contested case decided by the Commission under the new law. The complainant shipped from Frederick, Md., to Elberon, N. J., 372,200 lbs. of red brick. The rate charged was a class rate of \$3.80 per ton. The complainant alleged this rate to be unreasonable and unjust, and pending the controversy before the Commission the carriers reduced the rate to \$2.75 per ton. The Commission holds that the rate of \$3.80 per ton was unreasonable and unjust, and awards reparation to the complainant based on the difference between that rate and the rate of \$2.75 which was put in effect by the carriers after the complaint was filed.

TRADE CATALOGUES.

The Long-Bell Lumber Co.—It is the custom of the Long-Bell Lumber Co., Kansas City, Mo., each year to give its representatives an outing, the purpose of which is to make them better acquainted with the lumber country, to familiarize them with all details of the business from forest to mill, and to give them a pleasure trip. This year the special train consisted of a baggage car, two diners, six Pullmans and a private car. The trip lasted nine days and covered 3,000 miles. A detailed account of it, with numerous illustrations, has been prepared by the company and is being distributed, forming an interesting souvenir of the occasion. The book is an artistic piece of work, printed on heavy cream-colored plate paper, with suitable cover designs in colors. It is 10 x 14, contains 56 pages, and is complete in all details.

"Do You Know?"—This is the title of a little three-page pamphlet of the Detroit Seamless Steel Tube Co., Detroit, Mich., reminding the reader that "there is nothing new under the sun." It informs him that certain inventions, practices, etc., which are enumerated, popularly supposed to belong only to the present advanced age, were known to such ancient peoples as the Egyptians, or Babylonians. Some facts regarding "Detroit" seamless steel tubes are also included.

Storage Batteries.—Price list "C" of the Willard Storage Battery Co., Cleveland, Ohio, gives prices of elements in rubber jars, cabinet batteries and covered lead-lined tanks; it will be mailed on application.

Track Materials.—A new edition of "Track," the Railroad Supply Co.'s pocket companion for trackmen, is being distributed free

of charge. It has been fully revised and much new material added. The number of copies distributed will exceed 75,000, a majority of which are sent on requests from railroads. The general offices of the company are in the Bedford Building, Chicago.

Long Island Railroad.—This company has published an interesting 160-page pamphlet entitled "The Lure of the Land," being a story of the work done by the company at Experimental Station No. 1 on Long Island. The half-tone illustrations, which are plentiful, are unusually good.

Block Signals.—Bulletin No. 29 of the Union Switch & Signal Co. consists of an illustrated article on the automatic electric block signals made by this company for the electrified lines of the Long Island Railroad.

Valves and Packings.—Jenkins Bros., New York, have issued their 1907 catalogue and price list of valves and packings. It illustrates and describes a wide variety of these specialties.

Manufacturing and Business.

C. R. Kearns, who has been on leave of absence for six years on account of illness, has returned to the Nathan Manufacturing Co., New York.

The Bethlehem Steel Company has ordered from the Crocker-Wheeler Co., Ampere, N. J., one 500 h.p. direct-current motor to operate under 240 volts pressure at 450 r.p.m.

The Willard Storage Battery Co., Cleveland, Ohio, making a specialty of train-lighting batteries, has opened an office at 1525 First National Bank building, Chicago, to handle its western trade.

George A. Post, Jr., M.E., Cornell '05, has resigned as a sales engineer of the Westinghouse Machine Company and become engineer representative of the Standard Coupler Company, New York City.

The "Bull-Dog" Anti Rail Creeper, formerly manufactured by the Bryan Manufacturing Co., of Racine, Wis., will be now exclusively manufactured and sold by the Quincy, Manchester, Sargent Co., of Chicago and New York.

The following officers of the Locomotive Appliance Company have been elected: President, Ira C. Hubbell; Consulting Engineer, J. B. Alfree; Vice-Presidents, C. H. Howard, W. J. McBride and F. W. Furry; Secretary and Treasurer, W. H. England.

C. V. Seastone, Associate Professor of Sanitary Engineering, Purdue University, has resigned to take a position with Daniel W. Mead, Consulting Engineer, Chicago. R. L. Sackett, of Earlham College, has been appointed Professor of Municipal and Sanitary Engineering in Purdue University in his place.

The Colorado Gray Iron Foundry Co. has been formed in Denver, Colo., J. M. Herbert, formerly Vice-President of the Colorado & Southern, is President; S. C. Williamson is Secretary and Treasurer, and F. S. McNamara is General Manager. A new plant, said to be the largest of its kind west of Chicago, has been built at Third and Mulberry streets, Denver, and will employ at the start from 150 to 200 men. The main foundry is 110 ft. x 250 ft., and the pattern shop 60 ft. x 130 ft., all buildings being brick. Gray iron castings of all kinds will be made, the capacity being 75 tons a day.

The Hall Signal Company is to be reorganized according to the following plan, which has been approved by the directors and will be submitted to the stockholders. The new company is to have \$5,000,000 preferred and \$5,000,000 common stock. The \$100,000 preferred and \$1,900,000 common stock of the present company is to be exchanged for \$2,000,000 in preferred stock of the new company, and the holders of the present preferred stock are to receive, in addition, \$20 per share. Of the remaining new preferred stock, \$1,000,000 is to be issued at par with a bonus of \$1,000,000 common, and \$2,000,000 preferred is to be held in the treasury. Of the remaining \$4,000,000 common stock, \$2,500,000 is to be given to the underwriters, J. S. Bache & Co., New York, and \$1,500,000 is to be held in the treasury.

Iron and Steel.

The Winona Interurban has ordered 4,000 tons of rails, the Lexington Railway about 2,000 tons of heavy rails, and other electric lines have ordered an additional 3,000 tons.

Inquiries are being made for about 75,000 tons of rails for delivery during the latter half of 1907, and negotiations will soon be under way for rails to be delivered in the early half of 1908.

The general contract for the entire work for the approaches to the Blackwell's Island bridge over the East river at New York has been given to the Buckley Construction Co. It will require 8,300 tons of steel.

The Chicago, Milwaukee & St. Paul is in the market for about

8,000 tons of structural steel for bridges, and the Chicago & North-Western is negotiating for bridge work, requiring 4,000 tons of fabricated steel.

Orders have recently been given for 1,350 tons of bridge material by the New York, New Haven & Hartford to the Pennsylvania Steel Co., and Riter & Connelly. The New York Central has ordered 8,000 tons, and the Louisville & Nashville 1,500 tons of steel for bridges.

The Harriman Lines are in the market for 7,000 additional tons of rails for the Southern Pacific. The San Antonio & Aransas Pass is also in the market for between 7,000 and 8,000 tons. The Lehigh & Hudson River has ordered 6,000 tons, the New Orleans & Great Northern 2,000 tons, and the Johnstown, Ebensburg & Northern 3,700 tons.

OBITUARY NOTICES.

Robert H. Sayre, Chairman of the Board of Trustees of Lehigh University, died at his home in South Bethlehem, Pa., on January 4. Mr. Sayre was born in Pennsylvania in 1824. He worked in an engineering corps on the Morris & Essex Canal in 1840, and later on the Lehigh Canal. After working for some years on railroad construction, he went into the Lehigh Coal & Navigation Company. In 1852 he was elected Vice-President of the Delaware, Lehigh, Schuylkill & Susquehanna, now part of the Lehigh Valley. In 1882 he was made President and Chief Engineer of the Southern Pennsylvania, now the Cumberland Valley, and later was elected Vice-President of the Lehigh Valley in charge of the traffic and engineering departments. In 1886 he was appointed General Manager of the Bethlehem Steel Company, and in 1891, Vice-President.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Engineers' Club of Philadelphia.

At a meeting of this club January 5 a paper, illustrated by lantern slides, on "The Power Plant of the Ontario Power Company at Niagara Falls, Canada," was read by William M. White.

Railway Signal Association.

The January meeting of this association was held in New York City on Tuesday of this week. Vice-President A. H. Rudd occupied the chair, and about 75 members were present. Interesting discussions were had on How to Remedy the Effects of Foreign Currents on Automatic Block Signals; on Electric Locking for Interlocking Signals, and on other subjects which were left unfinished at the annual meeting last October. A report of these discussions will be given in a later issue. The committees for the ensuing year were announced as follows:

No. 1—Automatic Block Signal Systems.—George E. Ellis, Chairman; V. I. Smart, G. N. MacDougald, L. E. Kinch, W. H. Willis, S. N. Wight, A. H. Rice, G. N. Chappel, W. B. Weatherby and W. C. Long.

No. 2—Maintenance of Automatic Block Signals.—W. W. Slater, Chairman; J. G. Young, E. W. Newcomb, C. S. Pfisterer, E. M. Cutting, F. W. Pfeegling, A. H. McKeon and W. E. Boland.

No. 3—Circuits for Interlocked Signals.—H. W. Lewis, Chairman; J. Fred Jacobs, W. M. Spangler, E. O. Graham, H. K. Lowry, W. H. Harland, Jr., and H. O. Kline.

No. 4—Storage Battery.—I. S. Raymer, Chairman; J. E. Hackman, W. J. Eck, M. E. Smith, W. H. Fenly and A. H. Yocum.

No. 5—Maintenance Mechanical and Power Operated Signals.—C. E. Denney, Chairman; C. A. Dunham, B. F. Williston, W. S. Workman, Alex. Brown and Chas. L. Hackett.

No. 6—What Shall Constitute Cost in Estimates for Installation?—Frank Rhea, Chairman; W. J. Foale, B. H. Mann and R. E. Trout.

No. 7—Copper and Iron Wire for Pole Line.—W. M. Vanderluis, Chairman; J. R. Decker, D. W. Richards, W. H. Higgins and C. F. Jones.

No. 8—Standard Specifications for Electric Interlocking.—L. R. Clausen, Chairman; E. A. Everett, M. H. Hovey, A. Kelly, F. P. Patenall, G. C. Pfisterer, G. H. Dryden, E. B. Pry and J. J. Cozzens.

No. 9—Signal Definitions.—C. C. Anthony, Chairman; J. C. Mock.

No. 10—Office Records and Accounts.—E. B. Ashby, Chairman; W. A. Peddle and J. M. Fitzgerald.

No. 11—Signal Lamps.—Harry Hobson, Chairman; C. J. Cannon, F. J. Schmeiser, F. E. Wass and Chas. Geary.

No. 12—Rubber Covered Wire.—Azel Ames, Chairman; A. H. Rudd.

No. 13—Maintenance Manual Controlled Signals.—C. H. Morrison, Chairman; M. M. Case, N. E. Baker, A. C. Holden, W. P. Allen and J. I. Vernon.

No. 14—How to Remedy the Effects of Foreign Current on Automatic Block Signals.—W. H. Elliott, Chairman; J. M. Woldron, J. D. Phillips, W. H. Follet, C. A. Christoffersen and W. M. Post.

No. 15—Standard Specifications for Mechanical Interlocking.—T. S. Stephens, Chairman; W. J. McWain, J. B. Latimer and Daniel Cushing.

No. 16—Circuits for Manual Block Signal Systems.—S. P. Hull, Chairman; M. W. Bennett, F. B. Weigand, W. N. Schnure, B. O. Darrow and A. J. Loughren.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Atlanta & West Point.—W. H. Smith, Freight Claim Agent, has been also appointed Acting Auditor, succeeding F. A. Healey, Auditor, resigned.

Augusta Southern.—A. B. Andrews, First Vice-President of the Southern, has been elected also President of the Augusta Southern.

Birmingham & Atlantic.—Y. Vandenburg has been elected President, with office at New York City.

Chicago & Alton.—G. J. Pollock has been appointed Auditor and H. E. R. Wood, Treasurer, has been appointed Assistant Secretary, succeeding to the duties of C. H. Davis, Auditor and Assistant Secretary. The offices of both are at Chicago, Ill.

Chicago, Rock Island & Gulf.—J. W. Robins, Superintendent of the Gulf, Colorado & Santa Fe at Cleburne, Tex., has been elected Vice-President and General Manager of the Chicago, Rock Island & Gulf, with office at Fort Worth, Tex., succeeding S. B. Hovey, resigned.

Cincinnati, New Orleans & Texas Pacific.—C. A. McCormick, Chief of Mechanical Accounts, has been appointed Assistant Auditor.

Mobile & Ohio.—W. W. Finley, President of the Southern, has been elected also President of the Mobile & Ohio, succeeding Samuel Spencer, deceased.

New York, New Haven & Hartford.—E. J. Buckland has been elected Vice-President, with office at Providence, R. I.

Northern Central.—James McCrea, President of the Pennsylvania, has been elected also President of the Northern Central.

Pennsylvania Lines West.—Joseph Wood, Second Vice-President in charge of traffic, has been elected First Vice-President, succeeding James McCrea, promoted. J. J. Turner, Third Vice-President in charge of transportation, has been elected Second Vice-President. E. B. Taylor, Fourth Vice-President in charge of the treasury and accounting departments, has been elected Third Vice-President. D. T. McCabe, Freight Traffic Manager, has been elected a Director and Fourth Vice-President in charge of traffic. These elections apply to the Pennsylvania Company, which operates the Northwest System, and the Pittsburg, Cincinnati, Chicago & St. Louis, which operates the Southwest System of the Pennsylvania Lines West.

Operating Officers.

Atlanta & West Point.—E. W. Sandwich, Acting Car Accountant, has been appointed Car Accountant.

Atlantic Coast Line.—A. P. Connelly, Superintendent of Transportation of the Third division, has been appointed Superintendent of the Jacksonville division, with office at Sanford, Fla. O. H. Page, Superintendent of the Fayetteville district, succeeds Mr. Connelly, with office at Jacksonville, Fla.

See Central of Georgia.

Baltimore & Ohio.—F. C. Batchelder, Superintendent at Chicago, Ill., has been appointed General Superintendent at Baltimore, Md., succeeding C. C. F. Bent, transferred to the B. & O. Southwestern. B. W. Duer, Superintendent at Pittsburg, Pa., succeeds Mr. Batchelder. E. A. Peck, Superintendent at New Castle, Pa., succeeds Mr. Duer. W. W. Temple, Engineer of Maintenance of Way at Pittsburg, Pa., succeeds Mr. Peck.

Baltimore, Chesapeake & Atlantic.—A. H. Seth has been appointed Assistant to the General Manager of this road and of the Maryland, Delaware & Virginia. W. U. Polk, Assistant Engineer, has been appointed Superintendent of both roads, succeeding A. J. Benjamin, deceased.

Canadian Northern Ontario.—F. M. Spaidal, Superintendent of the Canadian Pacific at Montreal, has been appointed Superintendent of the Canadian Northern Ontario, with office at Toronto, Ont.

Canadian Pacific.—See Canadian Northern Ontario.

Central of Georgia.—W. H. Wright, Superintendent of the Savannah district of the Atlantic Coast Line, has been appointed Superintendent of the Central of Georgia, at Savannah, Ga., succeeding J. C. O'Dell.

Chicago, Burlington & Quincy.—E. E. Young, Trainmaster at Denver, Colo., has been appointed Superintendent at McCook, Neb., succeeding C. L. Eaton, resigned.

Coal & Coke.—J. C. Hiltabidle has been appointed Trainmaster, with office at Gassaway, W. Va.

Colorado & Southern.—A. Pardoe has been appointed Car Accountant, with office at Denver, Colo.

Denver & Rio Grande.—W. A. Whitney has been appointed to the new office of Superintendent of Transportation, with office at Denver, Colo. The office of Superintendent of Car Service has been abolished.

Gulf, Colorado & Santa Fe.—See Chicago, Rock Island & Gulf, under Executive, Financial and Legal Officers.

Illinois Central.—C. H. Groce, Superintendent of Telegraph, has been appointed Assistant to the General Manager, succeeding L. C. Fritch, promoted.

Maryland, Delaware & Virginia.—See Baltimore, Chesapeake & Ohio.

Mexican Central.—The office of R. I. Craig, Superintendent of the Torreon division, has been removed from Jimulco to Gomez Palacio.

Midland Valley.—W. J. Weir has been appointed Trainmaster, with office at Muskogee, Ind. T.

Oregon Short Line.—See Union Pacific.

Santa Fe, Prescott & Phoenix.—The office of General Superintendent has been abolished, W. E. Drake, General Superintendent and Chief Engineer, having been promoted. H. C. Storey, Trainmaster, has been appointed Superintendent, with office at Prescott, Ariz. See Santa Fe, Prescott & Phoenix under Engineering and Rolling Stock Officers.

Southern Pacific.—See Union Pacific.

Tehuantepec National.—H. A. Tolle has been appointed Superintendent of Terminals at Salina Cruz, Mexico.

Union Pacific.—J. M. Davis has been appointed Assistant General Superintendent of the Union Pacific, Lines West of Green river, of the Southern Pacific, Lines East of Sparks, and of the Oregon Short Line, with office at Salt Lake City, Utah.

Traffic Officers.

Alabama Great Southern.—E. Schryver, Assistant General Freight Agent of the Cincinnati, New Orleans & Texas Pacific, has been appointed General Freight Agent of the Alabama Great Southern, with office at Birmingham, Ala., succeeding L. Sevier, resigned to go to the Seaboard Air Line. See Cincinnati, New Orleans & Texas Pacific.

Canadian Pacific.—C. E. E. Ussher, General Passenger Agent of the Eastern Lines, has been appointed Assistant Passenger Traffic Manager of the Western Lines, with office at Winnipeg, Man. William Stitt, General Passenger Agent at Sydney, N. S. W., of the Canadian Pacific Steamship Lines, succeeds Mr. Ussher, with office at Montreal, Que.

Chesapeake & Ohio.—The office of F. M. Whitaker, Freight Traffic Manager, has been removed from Richmond, Va., to Cincinnati, Ohio.

Chicago, Milwaukee & St. Paul.—E. S. Keeley, General Freight Agent, has been appointed to the new office of Freight Traffic Manager. H. E. Pierpont, Assistant General Freight Agent at Chicago, Ill., succeeds Mr. Keeley. W. E. Prendergast has been appointed Assistant General Freight Agent at Chicago, Ill., succeeding E. G. Wylie, resigned.

Cincinnati, New Orleans & Texas Pacific.—G. P. Biles, General Freight Agent, has been appointed to the new office of Freight Traffic Manager of this road and of the Alabama Great Southern. H. A. Poveleite succeeds Mr. Biles. See Alabama Great Southern.

Grand Trunk.—W. P. Hinton, General Agent of the Passenger Department at Ottawa, Ont., has been appointed Assistant General Passenger and Ticket Agent at Montreal, Quebec.

Engineering and Rolling Stock Officers.

Atlanta, Birmingham & Atlantic.—J. E. Cameron, Master Mechanic, has been appointed Superintendent of Motive Power, with office at Fitzgerald, Ga.

Baltimore & Ohio.—See Baltimore & Ohio under Operating Officers.

Boston & Maine.—Henry Bartlett, Superintendent of Motive Power, has been appointed to the new office of General Superintendent of the Mechanical Department. C. H. Wiggin, Assistant Superintendent of Motive Power, has been appointed Superintendent of Motive Power. J. W. Marden, Assistant Master Car Builder, has been appointed to the new office of Superintendent of the Car Department, succeeding to the duties of J. T. Chamberlain, Master Car Builder, who has resigned after many years of service.

Boyne City, Gaylord & Alpena.—C. F. Gregory has been appointed Master Mechanic.

Chicago, Cincinnati & Louisville.—J. K. Sroufe, Engineer of Maintenance of Way, has resigned and the office has been abolished.

Chicago, Rock Island & Gulf.—J. S. Peter, Chief Engineer, has resigned to go to the San Antonio & Aransas Pass.

Georgia Southern & Florida.—George B. Herrington has been appointed Chief Engineer, with office at Macon, Ga., succeeding J. J. Gaillard, resigned to go to another company.

Lake Shore & Michigan Southern.—J. T. Carroll, general foreman of the locomotive department at Elkhart, Ind., has been appointed Assistant Superintendent of Shops at Collinwood, Ohio, succeeding R. D. Fildes, resigned. A. R. Sayres, assistant general foreman of locomotive shops at Collinwood, has been appointed Superintendent of Shops at Elkhart, Ind.

Lehigh & Hudson River.—R. F. Jaynes, general shop foreman, has been appointed to the new office of Master Mechanic, with office at Warwick, N. Y.

Louisville & Atlantic.—C. W. Moorman, roadmaster, has been appointed Engineer of Maintenance of Way.

Santa Fe, Prescott & Phoenix.—J. A. Jaeger has been appointed Chief Engineer, with office at Prescott, Ariz., succeeding, as Chief Engineer, W. A. Drake, General Superintendent and Chief Engineer, now Vice-President and Assistant General Manager. S. W. Higley, roadmaster, has been appointed Superintendent of Track, with office at Prescott. George Tisdale, general foreman of bridges, buildings and water service, has been appointed Superintendent of Bridges, Buildings and Water Service, with office at Prescott.

Purchasing Agents.

Atchison, Topeka & Santa Fe.—F. E. Connors has been appointed Assistant General Purchasing Agent, with office at Chicago, Ill.

Beaumont, Sour Lake & Western.—See Colorado Southern, New Orleans & Pacific.

Colorado Southern, New Orleans & Pacific.—J. H. Lauderdale, Chief Clerk to the Vice-President, has been appointed General Purchasing Agent and Treasurer of this road and of the Beaumont, Sour Lake & Western.

Galveston, Harrisburg & San Antonio.—F. C. Stewart, formerly general inspector of signals of the Union Pacific, has been appointed Signal Engineer of the Galveston, Harrisburg & San Antonio and of the other lines of the Atlantic System of the Southern Pacific.

Mexican Central.—H. Putnam, Assistant to the General Manager, has been appointed Assistant Purchasing Agent, with office at Mexico City, Mex., and his former office has been abolished.

LOCOMOTIVE BUILDING.

The National Railroad of Haiti has ordered two locomotives from the Vulcan Iron Works.

The Chicago Mill & Lumber Company has ordered one American (4-4-0) type locomotive from Robert M. Burns & Co.

The Lake Superior Southern will shortly be in the market for locomotives. The order will be placed through D. E. Baxter & Co., New York.

The Spokane International has ordered six simple consolidation (2-8-0) locomotives from the Rogers Works of the American Locomotive Company. The specifications are as follows:

General Dimensions.

Type of locomotive.....	Consolidation
Weight, total.....	230,000 lbs.
Weight on drivers.....	157,000 "
Diameter of drivers.....	57 in.
Cylinders.....	20 in x 28 in.
Working steam pressure.....	200 lbs.

Special Equipment.

Air brakes..... Westinghouse
Corrigan, McKinney & Co. have ordered three simple switch-

ing (0-6-0) locomotives from the Lima Locomotive & Machine Company. The specifications are as follows:

General Dimensions.	
Type of locomotive	Switching
Weight, total	124,000 lbs.
Diameter of drivers	50 in.
Cylinders	19 in. x 26 in.
Boiler, type	Straight top
" working steam pressure	180 lbs.
" number of tubes	272
" material of tubes	Shelby seamless
" diameter of tubes	2 in.
" length of tubes	10 ft. 6 in. over sheet
Firebox, length	96 in.
" width	34 "
" grate area	22.66 sq. ft.
Heating surface, total	1,621.51 "
Tank capacity	3,500 gals.
Coal capacity	6½ tons

Special Equipment.	
Air brakes	Westinghouse
Axles	Brass Foundry & Machine Co.
Boiler lagging	Magnesia
Brake-beam	National Hollow
Brake-shoes	Lima Locomotive & Machine Co.
Couplers	Tower
Headlights	United States
Injector	Sellers
Journal bearings	Lima Locomotive & Machine Co.
Piston rod packings	U. S. metallic
Valve rod packings	U. S. metallic
Safety valve	Crosby
Sanding devices	Lima Locomotive & Machine Co.
Sight-feed lubricators	Michigan
Springs	Pittsburg Spring & Steel Co.
Steam gages	Ashcroft
Tires	Latrobe

CAR BUILDING.

The Pittsburg & Lake Erie is reported in the market for cars.

The Baltimore & Ohio, it is reported, will soon order several thousand cars.

The Alfalfa Meal Co. has ordered five tank cars from Robert M. Burns & Co.

The National Railroad of Haiti has placed a contract with the Catawissa Car & Foundry Co.

The Coal & Coke has ordered 300 cars from the South Baltimore Steel Car & Foundry Company.

The Engle Land & Lumber Company has ordered five flat and one box cars from Robert M. Burns & Co.

The Astoria & Columbia River is in the market for three second-hand coaches and one second-hand baggage car.

The New Orleans & Northeastern has ordered 100 box cars and 125 flat cars from the American Car & Foundry Company.

The Chicago, Rock Island & Pacific has ordered 1,000 steel underframe dump cars from the American Car & Foundry Company.

The Buffalo, Rochester & Pittsburg has ordered 500 steel underframe hopper cars from the American Car & Foundry Company.

The Harriman Lines have ordered four coaches and two combination mail and baggage cars from the St. Louis Car Company.

The Lake Superior Southern will shortly be in the market for cars. The order will be placed through D. E. Baxter & Co., New York.

The Great Northern, it is reported, has ordered 500 steel hopper cars of 100,000 lbs. capacity from the American Car & Foundry Company.

The Pennsylvania, as reported in our issue of December 28, has ordered 2,500 steel underframe class XL box cars from the American Car & Foundry Company.

The Intercolonial has ordered from its own shops three motor cars similar to those used by the Great Western of England. These cars will be 65 ft. long and will seat 52 passengers.

The National Lines of Mexico have ordered 800 box cars of 80,000 lbs. capacity and 325 National dump cars of 100,000 lbs. capacity from the American Car & Foundry Company.

The Chicago Great Western has not ordered 300 box cars from the Pullman Company, as reported in our issue of December 21, but intends to build them at its South Park, Minn., shops.

The Delaware & Hudson has ordered from the American Car & Foundry Co. 1,500 steel underframe box cars, 1,500 steel underframe hopper cars, and 1,000 steel underframe flat cars with coal sides.

RAILROAD STRUCTURES.

CINCINNATI, OHIO.—The Louisville & Nashville will put up a new freight house at the corner of Pike and Washington streets, to cost between \$75,000 and \$100,000. Work is to be begun in February.

EAST PITTSBURG, PA.—The Pennsylvania is planning to build a new freight house to cost \$20,000.

FREMONT, NEB.—The Chicago & North-Western is putting up a brick freight house and office building 40 ft. x 30 ft.; also a warehouse 40 ft. x 200 ft., at a cost of about \$40,000.

LONDON, ONT.—Negotiations are under way between the Pere Marquette and the city officials for rebuilding the Port Stanley railroad bridges.

LOS ANGELES, CAL.—An officer of the Los Angeles-Pacific Railroad writes that the new passenger station to be built on the site of the Masonic Temple at Fourth and Hill streets, will be built of steel, granite and reinforced concrete with terra cotta facing. It is to be 240 ft. x 330 ft., is to have a frontage of 240 ft. on Hill street and a depth of 340 ft. It is to be 11 stories high, and will cost \$1,000,000. The plans provide for 1,700 office rooms, with a floor space of nearly 16 acres. Work is to started within the next few weeks.

MINNEAPOLIS, MINN.—The Chicago Great Western is making plans for a new passenger station to cost \$250,000 to replace the present one.

NEW WESTMINSTER, B. C.—The Great Northern is planning to put up shops here.

NORTH BAY, ONT.—Bids are wanted February 1 by H. W. Pearson, Toronto, Ont., Secretary of the Temiskaming & Northern Ontario Railway Commission, for putting up an office building.

OMAHA, NEB.—The Union Pacific is planning to increase its terminal facilities in Omaha, South Omaha and Council Bluffs. Contracts have been given for a paint and wheel shop to cost \$85,000 in Omaha, where the company is putting up shops covering five acres.

PORTAGE LA PRAIRIE, MAN.—The Canadian Northern has decided to build shops here.

ST. BONIFACE, MAN.—The Grand Trunk Pacific has bought a large tract of land here for \$200,000 as a site for terminals and shops.

STREATOR, ILL.—The Santa Fe is to put up a brick eight-stall roundhouse to replace the one recently burned.

TEMPLE, TEX.—The Missouri, Kansas & Texas is rebuilding its freight house and adding a 52-ft. extension.

WETASKIWIN, ALB.—The Canadian Pacific is planning to build a brick passenger station and freight sheds, to cost \$20,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AMERICAN RAILROAD OF PORTO RICO.—An officer writes that this company during 1906 completed 14 miles of road from Isabela to Camney, and is building an extension from Ponce to Coamo, 19 miles, also from Ponce to Barancas, four miles. Address George Servajeau, Isabela, Porto Rico.

APALACHICOLA NORTHERN.—This company, which last year built 20 miles of road between River Junction, Fla., and Apalachicola, has given contracts to the Morey Engineering & Construction Co., of St. Louis, for building the remaining 59 miles between these points. Grading has been completed from Apalachicola to St. Joseph's Bay, 19 miles. William A. Hunick is Chief Engineer of the Construction Company. (June 29, p. 189.)

ARKANSAS VALLEY.—See Atchison, Topeka & Santa Fe.

ASTORIA & COLUMBIA RIVER.—An officer writes that this company, which last year extended its road from Seaside, Ore., to Cartwright Park, has made surveys for an additional extension from the latter point south to Tillamook, 45 miles.

ATCHISON, TOPEKA & SANTA FE.—The Arkansas Valley has given contracts to Thomas Mishon & Co., of Pueblo, Colo., and to William C. Whitescarver, of Trinidad, Colo., for extending its road from its present terminus at Bristol, Colo., to Lays Junction, 17½ miles, and from Bent to Columbine, 41 miles.

ATLANTIC & WESTERN.—An officer writes that this company has projected a line from Broadway, N. C., east to Lillington, 15 miles. H. P. Edwards, Superintendent, Sanford, N. C.

BEAUMONT & SARATOGA TRANSPORTATION COMPANY.—An officer writes that this company, which completed eight miles of road last year in Texas, is building with its own forces a 3-mile extension from Sour Lake Junction to Pelt; also a branch from Sour Lake Junction to a connection with the Beaumont, Sour Lake & Western, three miles, and has projected a further extension from Pelt to Saratoga, 11 miles. Address J. H. Broome, Voth, Tex.

BAY SHORE RAILWAY.—See Southern Pacific.

BIRMINGHAM, COLUMBUS & ST. ANDREWS BAY.—An officer writes that this company, which has built a road from Chipley, Fla., to Warsaw, 12 miles, has given contracts to Lemuel E. Miller, Philadelphia, for building from Warsaw to St. Andrews Bay, 38 miles. Surveys are also being made for an extension from the northern terminus at Chipley, Fla., to Columbus, Ga., 150 miles. W. M. Gordon, President, Columbus, Ga. (See Construction Record.)

BONNEVILLE & SOUTHWESTERN.—This Arkansas company has completed surveys for a 3-mile extension of its road. Address J. F. Hineckley, St. Louis, Missouri.

CACHE VALLEY.—An officer writes that this company last year built five miles of road in Arkansas, and has given contracts to the Culver Construction Company of Sedgwick, Ark., for an extension from Walnut Ridge, Ark., east to Paragould, 28 miles. The company has also projected a line from Newport, Ark., southeast to the state line, 80 miles. E. W. Culver, Sedgwick, Ark., is President. (See Construction Record.)

CALIFORNIA NORTHEASTERN.—See Southern Pacific.

CANADIAN PACIFIC.—The following semi-official statement shows the work completed on the western lines (Fort William to Vancouver) at the close of 1906:

Extensions.	Mileage.
Moose Jaw branch	0 to mile 15.0
Wolseley-Reston branch	0 " " 97.5
Lauder extension	0 " " 16.0
Yahk branch	0 " " 9.5
Gimli extension	48.2 " " 57.3
Wetaskiwin branch	51.0 " " 98.5
Teulon extension	0 " " 9.5

Double Tracking between Fort William and Winnipeg.

Section.	Grading.	Track laid.	Turned over to operating dept.
Fort William	35.0	33.5	32.0
Ignace	42.0	24.8	28.5
Kenora	89.0	29.7	30.0

Ballasting and New Rails.

Division.	Ballasted.	80 lb. rails.
Central	107	55
Western	105	104
Pacific	84	76

New Steel Bridges Built or in Course of Erection.

Division.	Style.	Division.	Style.
Central—1	200-ft. through span.	Pacific—1	40-ft. deck plate girder.
2	70-ft. deck plate girder.	4	130-ft. through lattice trusses.
Western—1	125-ft. deck lattice span.	1	125-ft. through lattice truss.
3	80-ft. through lattice spans.	1	80-ft. deck plate girder.
1	30-ft. half-deck plate girder.	1	200-ft. through swing span.
Pacific—1	20-ft. half-d'k plate girder.	1	20-ft. deck plate girder.
1	60-ft. " " " "	1	30-ft. deck plate girder.
2	40-ft. " " " "	1	60-ft. half plate girder.
1	50-ft. deck plate girder.	1	100-ft. through latticespan

During the year the Paliser tunnel on the Pacific division and the Maoyie tunnel on the Sirdar section were finished and put in service.

CANANEA, YAQUI RIVER & PACIFIC.—See Southern Pacific.

CENTRAL RAILWAY OF OREGON.—An officer writes that this company last year built about seven miles of road in Oregon, and has given contracts for building a line from Union, northwest to La Grande, 45 miles. A. B. Brown, Union, Ore., is Chief Engineer. (Sept. 7, p. 62.)

CHARLOTTE HARBOR & NORTHERN.—This company, which built 10 miles of road in Florida last year, is building with its own forces an extension from Gasparilla, Fla., to Peace River, 29 miles, and is making surveys for a line from Arcadia to Plant City, an additional 65 miles. Address L. Fouts, 316 Duval Building, Jacksonville, Fla.

CHESTERFIELD & LANCASTER.—An officer writes that this company, which last year built 15 miles of road to Pageland, S. C., has given contracts to E. H. Page & Son for extending the road from that place to Lynch river, an additional five miles. A. H. Page, Cheraw, S. C., is Secretary and Treasurer.

CHICAGO, ROCK ISLAND & PACIFIC.—Contracts have been given to the Dalhoff Construction Co., of Little Rock, Ark., for extending the Rock Island, Arkansas & Louisiana from Alexandria, La., to Eunice, 55 miles.

CINCINNATI & BIRMINGHAM AIR LINE.—An officer writes that this company is making surveys for a line from Paintsville, Ky., south through Tennessee to Birmingham, Ala., 400 miles. J. H. Connor, President, Nashville, Tenn.

COALINVILLE, ALTON & ST. LOUIS.—This company has projected a line from Alton, Ill., to Coalinvill, 32 miles. J. M. Rhoades, Secretary, Jerseyville, Ill.

COAST LINE RAILWAY.—See Southern Pacific.

COLORADO, COLUMBUS & MEXICAN.—An officer writes that this company, projected to build from Columbus, N. Mex., to Salt Lake City, Utah, about 500 miles, has finished preliminary surveys and expects to build 100 miles this year. Address A. O. Bailey, Columbus, N. Mex.

COLORADO, TEXAS & MEXICO.—An officer writes that contracts have been given by this company to the Colorado, Texas & Mexico Construction Co., of Mangum, Okla., for building its proposed road from Mangum, Okla., south to Abilene, Tex., 269 miles. Morris R. Locke, President, Mangum, Okla.

CUMBERLAND RIVER & NASHVILLE.—An officer writes that this company is making surveys for a proposed line from Corbin, Ky., to the Tennessee state line at a point southwest to Albany, Ky., 95 miles. The section from Burnside, Ky., to Monticello, has been located and is soon to be under construction. S. Woodward, Carlisle Building, Cincinnati, Ohio, is President. (See Construction Record.)

DONIPHAN, KENSETT & SEARCY.—An officer writes that this company built two miles of road last year in Arkansas, and will build an additional 4½ miles from Kensett west to Searcy. H. R. Kilpatrick, Kensett, is General Manager.

DULUTH & NORTHERN MINNESOTA.—This company is building with its own forces a 4-mile extension.

DULUTH, RAINY LAKE & WINNIPEG.—Contracts have been given by this company to the Minnesota Land & Construction Co., for extending its road from milepost 50, to which point the road was extended last year, to Rainier, Minn., 35 miles.

EDDY LAKE & NORTHERN.—This company, which last year built 15 miles of road to Brown Swamp, S. C., has given contracts to R. E. Broty, for extending its line from that place to Marion, 20 miles.

FALLON RAILWAY.—See Southern Pacific.

GEORGIA, FLORIDA & ALABAMA.—Surveys are being made by this company for an extension of its road from Cuthbert, Ga., to Columbus, 63 miles.

GILA VALLEY, GLOBE & NORTHERN.—See Southern Pacific.

GRAND TRUNK PACIFIC.—The Transcontinental Railway Commission is asking for bids, which close February 14, for building five additional sections of the eastern half of the Grand Trunk Pacific as follows: From Moncton, N. B., west 50 miles; from Grand Falls, N. B., to the New Brunswick-Quebec boundary, 62 miles; from Quebec bridge east 150 miles; from a point 150 miles west of Quebec bridge west to Weymontachene, 45 miles; from a point about eight miles west of the Abibibi river east 150 miles, in all 457 miles. When these contracts are let about half the mileage between Moncton and Winnipeg will be under contract.

ILWACO RAILWAY & NAVIGATION.—See Oregon Railroad & Navigation Co.

INTER-CALIFORNIA.—See Southern Pacific.

MCCLOUD RIVER.—An officer writes that this company, on the 15th of the present month, will change the terminus of its line from Upton, Cal., to Sisson, at which point connection will be made with the Southern Pacific. The company now has a road with a total length of 79.63 miles, and is building with its own forces an additional 25 miles.

NIAGARA, ST. CATHARINES & TORONTO.—This company, which last year extended its road to Fonthill, Ont., has given a contract to Joseph Battle, of Thorold, Ont., for extending the line from Fonthill to Welland, five miles. The company is making surveys for a line from St. Catharines, Ont., to Niagara-on-the-Lake, 12 miles.

OREGON RAILROAD & NAVIGATION.—This company has under construction a line from St. Johns, Ore., to Troutdale, 20 miles, and the Ilwaco Railway & Navigation Co. is building a 3-ft. gage line from Ilwaco, Wash., to Knappton, 17 miles.

A line has been located to be built under the name of the Umatillo Central, from Pendleton, Ore., to Pilot Rock, 14 miles.

OREGON WESTERN.—See Southern Pacific.

PORTLAND TERMINAL.—This company has projected a line from Portland, Ore., to the Tualatin river, 20 miles. J. T. Burkhart, Portland, Ore., may be addressed.

PRESCOTT & NORTHWESTERN.—An officer writes that this company is making surveys for a line from the Gurdon & Fort Smith at Rosborough, four miles west of Amity, Ark., to a point near Kirby, eight miles.

ROCK ISLAND, ARKANSAS & LOUISIANA.—See Chicago, Rock Island & Pacific.

SACRAMENTO SOUTHERN.—See Southern Pacific.

SOUTH DAKOTA CENTRAL.—This company, which last year built six miles of road to Rutland, S. Dak., has projected a line from Rutland to Watertown, 75 miles. J. L. Wagner, Fort Dodge, Iowa, is interested.

SOUTHERN PACIFIC.—An officer of the Cananea, Yaqui River & Pacific writes that this company, which built seven miles of road last year in the state of Sonora, Mex., has given a contract to the Grant Bros. Construction Co., of Los Angeles, Cal., for extending the road from Buena Vista, state of Sonora, Mex., to Tonochi, about 80 miles, and from a point 15 miles from Corral to Alamos, 68 miles.

This company has under construction work as follows:

Fallon Railway, between Hazen, Nev., and Fallon, two miles.

Coast Line Railway, between Santa Cruz, Cal., and Davenport, seven miles.

Sacramento Southern, between Sacramento, Cal., and Antioch, 50 miles.

Bay Shore Railway, between San Francisco, Cal., and San Bruno, six miles.

Oregon Western, between Drain, Ore., and Marshfield, 72 miles.

California Northeastern, between Weed, Cal., and Klamath Falls, Ore., 64 miles.

Inter-California, projected from Calexico, Cal., near international boundary, southeast through Mexico, thence northeast crossing the international boundary line near Colorado river to a connection with the Southern Pacific line near Yuma, Ariz., a total of 54 miles. About four miles in California completed last year.

The Gila Valley, Globe & Northern has given contracts to Robert Scherer & Co., of Los Angeles, Cal., for relocating 13½ miles of its line near Fort Thomas, Ariz., and 12 miles from Rice to Cutter.

UMATILLO CENTRAL.—See Oregon Railroad & Navigation Co.

RAILROAD CORPORATION NEWS.

ATCHISON, TOPEKA & SANTA FE.—See Union Pacific.

ATLANTIC COAST LINE.—See Seaboard Air Line.

BALTIMORE & OHIO.—See Union Pacific.

CHATEAUGAY & LAKE PLACID.—This company has been authorized to increase its 4 per cent. preferred stock from \$2,000,000 to \$3,000,000 to reimburse the Delaware & Hudson, which controls and leases the road, for standard gaging and other improvements made several years ago. The C. & L. P. runs from Plattsburg, N. Y., to Lake Placid, 80 miles, of which 16 miles is leased from the state of New York, and there is also \$450,000 of common stock outstanding.

CHICAGO & NORTH-WESTERN.—See Union Pacific.

CHICAGO, MILWAUKEE & ST. PAUL.—See Union Pacific.

CHICAGO, MILWAUKEE & ST. PAUL.—There has been much dissatisfaction because the terms of the issue of new preferred and common stock of this company did not provide for the distribution of fractional shares to holders of odd lots of the present stock. The company has, therefore, announced that it will find out the amount of such fractional shares due to shareholders and separate them into lots of preferred and common stock and sell them at public auction. From the amount realized at the sale, the company will deduct \$100 per share as being the amount due to its treasury and the balance will be distributed in cash among the fractional shareholders in proportion to their holdings of record on December 19, 1906. (Dec. 21, p. 176.)

DELAWARE & HUDSON.—The United Traction Company of Albany, which is controlled by the Delaware & Hudson, has been given permission to increase its capital stock from \$5,000,000 to \$12,500,000 in order to take over the \$3,000,000 outstanding stock and \$6,410,000 outstanding bonds of the Hudson Valley, most of which, it is said, have already been acquired. The Hudson Valley owns 120 miles of electric road from Waterford, N. Y., north.

ERIE.—The Erie has sold \$1,000,000, six months, 6 per cent. notes to F. S. Moseley & Company, who are offering them at par and interest. Half of the notes are dated December 1, 1906, and half January 2, 1907. They are the last allotment of an issue which J. P. Morgan & Company took some months ago.

GREAT NORTHERN.—The purposes of the new \$60,000,000 issue are as follows: To provide for additional equipment, additional terminal facilities, second track, grade reduction and other improvements; to acquire the bonds or stocks, or both, of the following companies and such others as may be decided on later: The Dakota & Great Northern, a 131-mile subsidiary; the Mon-

tana & Great Northern, a 143-mile subsidiary, and the following companies which have built and are building branch lines and extensions of the Great Northern system: the Billings & Northern, the Washington & Great Northern, the Portland & Seattle, the Vancouver, Victoria & Eastern, the Brandon, Saskatchewan & Hudson's Bay and the Midland of Manitoba.

HOCKING VALLEY.—See Kanawha & Michigan.

HUDSON VALLEY (ELECTRIC).—See Delaware & Hudson.

ILLINOIS CENTRAL.—See Union Pacific.

KANAWHA & MICHIGAN.—President Monsarrat, Decatur Axtell, Chairman of the Board, and G. D. Mackay, who has been elected a Director succeeding Chas. G. Hickox, have been appointed a committee to consider the question of funding outstanding equipment obligations and other debts in order that the stockholders may receive a fair proportion of net earnings pending the completion of the merger with the Hocking Valley, which has been deferred until March 1. (Aug. 10, p. 40.)

MACON, DUBLIN & SAVANNAH.—See Seaboard Air Line.

NASHVILLE, CHATTANOOGA & LOUISVILLE.—A semi-annual dividend of 3 per cent. on the \$10,000,000 outstanding capital stock has been declared, payable February 1. The annual rate was 5 per cent. in 1905 and 1906, and 4 per cent. in 1904.

NEW YORK & PORTCHESTER.—Permission has been given this company to make a mortgage for \$20,000,000 and to increase the capital stock from \$250,000 to \$20,000,000. In giving this permission the New York State Railroad Commission announced that at no time may the aggregate outstanding bonds of this company and the New York, Westchester & Boston, which is owned by the same interests, exceed \$20,000,000, nor may the aggregate outstanding stock of the two companies exceed that sum. (Nov. 23, p. 146.)

NEW YORK, NEW HAVEN & HARTFORD.—A bill is to be introduced in the Connecticut legislature to allow the holders of the \$30,000,000 3½ per cent. convertible debenture bonds to share in stockholders' rights in future issues of the New York, New Haven & Hartford. This rule is to apply even though the debentures are not fully paid up.

NEW YORK, WESTCHESTER & BOSTON.—See New York & Port Chester.

PHILADELPHIA & WESTERN.—It is proposed to form a syndicate representing about \$3,000,000 to fund all the debt of this company, which has built 11 miles of its road now under construction from Philadelphia to Parksburg, Pa., 45 miles. After the road is opened certificates of participation in the syndicate are to be exchanged for stock and bonds of the company. It is planned to make extensions of the road west to Harrisburg and to York to a connection with the Western Maryland.

OREGON SHORT LINE.—See Union Pacific.

ST. JOSEPH & GRAND ISLAND.—See Union Pacific.

SEABOARD AIR LINE.—This company has bought, from the Atlantic Coast Line, the Macon, Dublin & Savannah, which owns 92 miles of road from Macon, Ga., to Vidalia, on the S. A. L. The \$2,400,000 stock and \$1,880,000 mortgage bonds were all owned by the Atlantic Coast Line, which company, it is said, can afford to sell the road because traffic agreements with the Central of Georgia and the Southern take its place. By getting trackage rights from Atlanta to Macon, the Seaboard Air Line can now have a short route from Atlanta to Savannah.

UNION PACIFIC.—In the investigation being made by the Interstate Commerce Commission of the relations of the Harriman Lines with other companies, William Mahl, Comptroller of the Union Pacific, testified that the following purchases had been made by the Union Pacific and the Oregon Short Line since June 30, 1906:

	Union Pacific.	Per cent. of this issue outstanding.
Illinois Central stock	\$28,123,300	30 per cent.
St. Joseph & Grand Island, common	2,900,000	63 "
1st pf. (about)	932,200	17 "
2d pf.	1,250,000	36 "
<i>Oregon Short Line.</i>		
Atchison, Topeka & Santa Fe pf.	\$10,000,000	9 per cent.
Baltimore & Ohio com.	32,334,200	21 "
Baltimore & Ohio pf.	7,260,000	12 "
Chicago, Milwaukee & St. Paul com.	3,690,000	4½ "
Chicago & North-Western com.	2,572,000	3 "
New York Central & Hudson River stock ..	14,285,745	8 "

UNITED TRACTION COMPANY OF ALBANY (ELECTRIC).—See Delaware & Hudson.

WASHINGTON, ALEXANDRIA & MT. VERNON (ELECTRIC).—An initial dividend of 1 per cent. has been declared on the \$1,500,000 capital stock of this company, which owns 25 miles of electric road in and near Washington, D. C. The above stock was issued in March, 1905.